The Builder.

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What the Wild Waves are Saying at the Isle of Wight.

EVERYBODY remembers what Douglas Jerrold said in reference to the English *penchant* for celebrating every event by a public dinner. "If an earthquake were to engulph England to-morrow," said the wit, "the English would manage to meet and dine somewhere, just to celebrate the event." The remark made to us by a friend at Ventnor recalled to mind Jerrold's joke. Alluding to the gradual and certain inroads that the sea is making on the southern side of "The Garden Isle," and more particularly at Ventnor, our friend jocosely said,—"Well, you need not be surprised, when next you come over, to see us all perched on top of St. Boniface Down!" St. Boniface Down is a hill rising 800 ft. above the level of the sea; and, as Ventnor lies immediately at its base, it is only natural to suppose that the inhabitants would make for St. Boniface in any emergency of the kind. For the sake, at least, of the suffering multitudes who annually betake themselves to that delightful resort, in quest of that health which has been denied them elsewhere, let us sincerely hope that no such dire calamity may befal the English Madeira. And yet, it is not to be concealed that there are signs of regret and insecurity, if not of alarm, in Ventnor at the present moment. The sea *is* nearer to St. Boniface, and, consequently, nearer to the town of Ventnor than it was formerly. And it is advancing.

The history of the Isle of Wight furnishes abundant proof that a mightier conqueror than the Romans has set foot on its shores. Neptune has taken possessions that can never be regained. The islanders are being invaded by the great sea-king, and they have not hitherto been able to oppose his progress. The well-known Undercliff itself is the result of a succession of landslips from the chalk downs above. The Undercliff, which may be said to extend from Bonchurch to Blackgang Chine, a distance of about seven miles along the coast, consists of a series of shelves or terraces of chalk, sandstone, and rock, varying from a quarter to half a mile in breadth, and six miles in length, gradually sloping towards the sea, and ending in an esplanade generally 80 ft. or 100 ft. in height above the tide. This extensive alteration was occasioned by what is termed blue slipper, a very soft substratum full of springs, gradually undermining the upper sandstone. It is conjectured that the greater portion of the landslip occurred more than 1,000 years ago; but the undermining process is still going on in those portions of the cliff nearest the sea, though, of course, on a far less gigantic scale. At the eastern end of the cliff, the land between the sea-cliff and the pathway was recently swept away, and may now be seen lying in confused masses on the beach. The great landslip at East End, near Bonchurch, one of the grandest sights in the island, was the result of two landslips, one in 1810, of thirty acres; the other, eight years afterwards, of fifty acres. It is the peculiar formation of the Undercliff, sheltered as it is from all violent winds by the lofty downs above, that gives Ventnor, according to Sir James Clark, its superiority as a resort for invalids suffering from chest complaints. One odd consequence of the precipitous and broken nature of the Undercliff is, that in going to many of the houses, you ascend a flight of steps to reach the front door, while, if you wish to enter by the rear of the house, you will have to descend a corresponding flight. In the reign of Charles I., the small fort at Sandown, erected by Henry VIII., was removed, the sea having threatened to swallow up its "porter and three gunners," with its "eleven pieces of brass and iron ordnance," its "firkin of powder and seventy-eight hagbuts," its "chest of bows and arrows," and other formidable armament. "The remains of its foundations," says an old writer, "are sometimes to be seen when the tide is out, especially after a high spring flood." It is said that the old fort stood no less than 1,000 ft. further into the sea than the present fort, and nearer to the now demolished Royal Heath Villa, where John Wilkes spent the latter years of his life. To the south-east of the neat little village of Bembridge may be noticed a large bed of rock, called Bembridge Ledge, formed by the action of the tide washing the upper portions of the cliff away. On this ledge the ship *Henry Arlington* was wrecked thirty years ago. Once upon a time, long after the Isle of Wight had ceased to be Vectis, and Brading had ceased to be its capital, Brading Haven was a spacious green pasture, where kine were wont to graze. When we saw it, the haven presented a superficial area of seven or eight hundred acres of water, with one or two small crafts floating on its bosom—a very picturesque picture as seen from Brading Downs. At low water, its appearance is widely different. Then you see nothing but a broad expanse of mud, with the river Yar winding its muddy way like a great eel down to the sea. Various but futile attempts, it is said, have been made to reclaim the land. Every visitor to Freshwater has seen the Needles which form the northern point of Scratchell's Bay. There are three rocks so called—huge, misshapen masses of glittering chalk towering amid the blue waters, "like the pillars of some unfinished temple." These rocks are white, but black at their bases, and curiously streaked throughout with blue strata of flints. In the sun they have the appearance of striped silk. There can be no doubt that they once formed the original headland; but the sea, asserting its power, has isolated them from the mainland, and fashioned them into their present rugged and fantastic forms. Just one hundred years ago, the spiral rock, from which these rude giant columns are supposed to have derived their name, fell with a tremendous roar and a concussion that was felt all over the island. This rock, which was 120 ft. high, was known among seamen by the unlucky name of Lot's Wife. A lighthouse, built in 1858, stands on Needles Point, 700 ft. above the level of the sea. It is mounted with ten Argand lamps, and ten plated reflectors, whose light is visible eleven leagues off. The term, "iron-bound coast," does not apply to the Isle of Wight, whatever applicability it may have to other of the sea coasts of the kingdom.*

But let us return and hear what the wild waves have been saying more recently at Ventnor. If their story be not so poetical or romantic in its character as that already given, it may have a more practical importance and application. Ventnor, thirty years ago, was a mere village, "unknown, unhonoured, and unsung." It consisted of only a few huts, and its visitors must have been few and far between. The spiritual wants of the place were not large enough to support a church, while its spiritual wants of another sort were satisfied with one public-house. But Ventnor rose one morning and found herself famous. The highest medical authority in the land gave the opinion that the climate of Ventnor was superior to that of Torquay, or any other place on the south coast. The fortune of Ventnor was made. Year after year the picturesque terraces of the Undercliff were dotted with elegant villas, and the town rapidly increased in size and population: Ventnor is now a bustling town of 5,000 inhabitants. It has six places of public worship, six hotels, and all the luxuries of the age. Of the luxuries of the season, it has perhaps more than most other places. The Ventnorians are, naturally, very proud of Ventnor. They will almost persuade you into the belief that premature death is a thing unknown in the place. The inhabitants all die of that rarest of diseases elsewhere, extreme old age,—provided they do not fall over one of the cliffs. However, it is only proper to state, what must be pretty generally known, that the average death-rate in the Isle of Wight is lower than that of any other watering-place. And Ventnor is undoubtedly one of the healthiest places in the kingdom. Among the recent schemes projected, and partly carried into effect for the improvement of the town, were a pier and jetty, or breakwater. The undertaking, we are sorry to say, has proved a sad failure, and the money,—the enormous sum of 100,000*l.*,—has been literally thrown into the sea. Such, at any rate, is the opinion of a number of persons in Ventnor, who look upon the scheme as a mistake. Both pier and breakwater are of wood, large piles of timber being driven into the beach, and floored over with strong planks in the usual style of wooden piers. The interstices are filled up with stones to strengthen the foundation. The pier is built in the form of a curve, tending towards the breakwater, a sufficient entrance being left for the admittance of small vessels into a basin which answers for the harbour. Stout as the pier looks, it has proved altogether powerless to cope with the insidious waters. In one of its fits of tempestuous wrath, the sea has started nearly every timber, twisting its iron bolts and bars, as a child might twist a pin, and ripping up and coiling its zinc parapet as if it were parchment. There it stands, a complete wreck, and fitting monument of somebody's want of judgment. The breakwater, not being exposed broadside to the full force of the sea, as is the pier, has not suffered to the same extent. But the damage done does not rest here. Certain excavations made for the formation of the pier and harbour disturbed or undermined the foundation of a chalk cliff which overhangs the harbour. The result was a landslip; and the consequence of that, again, has been the ruination of a row of handsome and comparatively new villas situated on the summit of this cliff. These villas, lately comfortable dwellings, are now tenantless ruins, rent from top to bottom, as if they had been torn apart. One villa only has escaped, but how long it may remain intact is a question, since the gable end of another fell to the ground not a fortnight ago. Of the treacherous nature of some portions of the Undercliff there can be no doubt whatever. At the time of our visit, men were engaged in "shoring" with stones a part of one of the lower terraces which had given way. The soil had the colour of Fuller's earth, and looked as unstable as sand.

What more apt illustration of change than the weathercock? What changes like the weather?—

* Nor, strictly speaking, does the phrase apply to the "white cliffs of Albion." We read in last week's paper that, as a consequence of the recent storm and severe gales, the violence of the sea has considerably encroached upon the slip of land which connects the eastern cliff with the remainder of the sea-frontage at Dover. The whole of the promenade has disappeared, and a semi-circular inroad has been made upon the carriage-way.

what so fair to-day, what so foul yesterday? This is true of even Ventnor weather. There we were in the English Madeira in the middle of bleak and bare January; but not bleak and bare here. The sea is *not* like glass, and is less like a mirror; but its tiny waves dance in the warm sunshine, and chase and tumble over each other like children playing at catch! A group of fair islanders are instituting a vigorous search among the shingle for "Isle of Wight diamonds." Roses are actually in bloom in the open air; and have we not just left a pleasant parlour, fragrant with the smell of myrtle, hyacinths, and "sweet-scented stocks?" The trees have not lost their leaves, and the miles of ivy hedgerows testify to the wonderful fertility of the soil. There is hardly a breath of wind to disturb the smoke which is curling languidly to the clear blue sky from a score of villas. This is surely summer in winter. The pier lying there, like a stranded ship, presents a strange contrast to the calm beauty of the surrounding scene. It seemed scarcely possible that so sunny a spot could ever be visited by "the fury of the elements." Yet here were unmistakable proofs of an angry sea, and a terrible storm. Those tiny waves, glittering in the sun, may to-morrow grow into black foaming breakers, sweeping over the pier, and making the shingle rattle against the bathing coaches, or tossing it like hail on to the esplanade—"the shingle," as was explained to us with much gravity by a seafaring individual, "being a moveable body, acted upon both by wind and water." These shingles, which have done so much injury to the shores on this side of the island, have a curious history. Sixty years ago the beach at Ventnor, was covered with a beautiful smooth sand. There were no shingles east of Rocken-end, about five miles distant. Now they entirely cover the shore from that place to Bonchurch, and extend to Freshwater in the opposite direction. They have been carried eastwards by the tides, which are said to be more rapid here than formerly, owing probably to the wearing away of many points of land and rocks that projected into the sea, and defended these creeks along the shore. During the recent violent storms, a large island of shingles, several acres in extent, was driven up to the west of the Needles. The shingles or pebbles consist of rounded silicious fragments, about the size of beans. They are of a great variety of colours, and some of them are very beautiful, particularly those known as Isle of Wight diamonds. However, it is the absence of shingle at Sandown and Shanklin, that has made these charming spots superior to Ventnor for sea-bathing. In the interests of visitors, as well as of the inhabitants themselves, we must here allude to a matter about which we heard a good deal of complaint from various quarters. We mean the accumulation of seaweed on the beach. Cart-loads of this article, carried in by spring tides, now lie rotting within a few feet of the favourite promenade of visitors. The smell during our visit was most offensive, and we are told that in warmer weather it is ten times worse. This detestable odour arises of course from the fact that the weed is not growing, and that the water laves it only at spring tides. Can nothing be done to utilize it? Seaweed, as is well known, is a valuable manure for land. What objections there may be to its being so used by the Ventnor agriculturists, we do not know. It is extremely doubtful, at all events, if the sea will, in this instance, turn sanitary commissioner, and carry the rubbish away again. Meantime it is a nuisance to the place, and, as we have said, the people have begun to feel it.

Since a pier is a boon to Brighton, and Ramsgate, and Ryde, and almost every watering-place, there is no need to argue that a pier would be an advantage to Ventnor. It seems evident, however, that the erection must be a stone one, and granite, if possible. Unfortunately for the Isle, her public works have not been particularly successful. Speaking of the new pier at Ryde, a local writer says,—"The new pier was commenced by a company called the Stokes Bay Railway and Isle of Wight Ferry Company. This afterwards merged into the Ryde Quay Company. Altogether their proceedings were enveloped in 'Egyptian darkness.' They carried on the works to the present state, and then mysteriously stopped, probably for lack of means, as well as lack of power. On the whole, the works are no improvement to the town in an ornamental point of view."

At Ashey Down, between Ryde and Newchurch, are the waterworks erected in 1854, "at a ruinous cost, by the over-zealous and misguided Ryde commissioners, notwithstanding the numerous warnings given them at the time by persons whose opinions, to say the least, should have had an impartial hearing." Our present interest being more particularly in Ventnor, we hope that the mistake made there may soon be rectified by the erection of a pier that shall be a service as well as an ornament to the place. What Sir Walter Scott said of the Isle of Wight generally, applies especially to Ventnor and its neighbourhood. He calls it,—"That beautiful island which he who once sees never forgets, through whatever part of the wide world his future path may lead him."

ON THE CONSTRUCTION OF IRON ROOFS.

We have occasionally to record disasters of more or less severity occurring during the erection of iron roofs. Not long ago a portion of the Ludgate-hill Station roof fell in; and still later we hear of the fall of a portion of the roof of the London-road Station at Manchester, of which we give further particulars in our present number. The latter accident was of a somewhat unusually grave character. No less than thirty men engaged at the time upon the upper portion of the roof accompanied it in its disastrous fall, two of them being killed, and many of the entire number dangerously hurt. In neither of these cases does it appear that the accident could be attributed to want of skill or knowledge so far as the designs of the respective roofs were concerned. Indeed, in most cases where iron is employed in any structure, a very considerable margin is allowed in excess of the required strength. The improper fixing, however, of a few ties or struts tends largely towards decreasing the general stability of such structures, and deranges all the precautions and calculations of the engineer. It is, obvious, therefore, that one of the most essential requisites in properly and safely carrying out the construction of roofs is to have the superintendence of a responsible and well-qualified clerk of works, and one who is known to be capable of undertaking the final and satisfactory completion of the undertaking. An iron roof is likely to be much affected by the nature of the masonry upon which it rests, as was evinced some time ago in the fall of the station-roof at Bilbao, in Spain.

Many instances of the falling in of roofs may be fairly attributed to the character of the masonry,—not that this is in every case of doubtful quality, but because the part it plays in having to sustain permanently a very heavy dead-weight is likely to be to some extent overlooked by an inexperienced ironwork contractor.

In the Exhibition of 1862 the walls were in danger of being thrust out by the superincumbent weight of the roof; and it is mentioned in the first volume of the record of that Exhibition by Mr. Hollingshead, that it became necessary to adopt after-precautions, to prevent this occurrence from actually taking place.

Strong iron braces were anchored to the foundation of the inner columns of the galleries, and carried up to the top of the opposite outer columns, and thus the thrust of the roof was effectually counteracted. This vertical cross-bracing was repeated at every 100 ft., or fourth bay; and, by introducing horizontal diagonal bracing under the roof-flats, they were turned into deep horizontal girders, supported at two ends by the braced columns.

Upon the fall of the Bilbao Station roof, it was ascertained that the masonry portion of the structure had not been allowed to become sufficiently consolidated, taking into account the quality it was afterwards discovered to possess, to admit of its being safely encumbered with the weight of the roofing or covering in.

Apart from the causes already suggested, however, as leading to the untimely and, in many cases, the fatal giving way of roofs, there are others which may be attributed to the quality of the metal employed in the superstructure.

No want is more deprecated by engineers of the present day than that of a thoroughly trustworthy iron or steel. The want of a good quality of iron which should, to be serviceable, always possess the same character, in however various and extensive quantities it may be supplied, is already beginning to pave the way for the more general employment of steel.

Standing apart as an almost new and independent style of architecture, we may now see various and extensive buildings, with scarcely any masonry whatever attached to them. In many cases where masonry is employed, it manifestly holds only a subordinate relation to the more important features of the structure. Iron is, moreover, beginning to be very largely used in general and household architecture. The new Pimlico Wheel Works, for example, which have been erected upon the site of the old works, lately destroyed by fire, are almost entirely constructed of iron.

In smaller buildings and in dwelling-houses the adoption of iron is becoming general at those parts where heavy weights rest or great lateral strain has to be borne. It has been ascertained by a series of carefully made experiments that a sudden strain upon a bar of wrought-iron shows a loss of strength in the metal of 18·5 per cent. as compared with what it will endure under a gradual strain. A still more curious result has attended some similar experiments made upon cast-iron. It is yet, in all probability, a very prevalent opinion that cast-iron for some purposes may be more suitable on account of its being supposed to possess greater rigidity, although it may be known not to possess the ultimate strength of wrought-iron. This is, however, proved to have been a fallacy. The relative compressibility of cast and wrought iron under the same load shows that cast-iron may be compressed at this uniform load to double the extent of wrought-iron. The numerous and important improvements which have lately been made, however, in the mixing and manufacture of iron, and in its ready assumption of the properties of steel, are opening the way to a new and untrodden industry. Experiments have lately been made at Mr. Kirkaldy's testing works in Southwark, upon some samples of steel which Messrs. Ordish and Le Feuvre designed to use in some portions of the new suspension-bridge they are erecting over the Moldau in Prague. The results of these experiments have proved in every way satisfactory.

This undertaking, in connexion with the employment of the harder and lighter metals, will be regarded with much interest, as it affords the first example of any work of magnitude in which steel will have been actually employed. Its application to the superstructure of large roofs and its more extended use in the wider fields of engineering may be expected speedily to follow.

The metal upon which these experiments were made is termed Howell's homogeneous metal. Its elasticity is such that a bar only 10 ft. long, elongated 8¼ in., and bore the extraordinary strain of 44 tons per square inch, allowing the safest working strain ever yet attained, of 26 tons per square inch, at which strain there was no permanent set. Wrought-iron is known to be almost entirely infusible, but when cut into scraps and put in a crucible along with 5 or 6 ounces of charcoal to every 40 lb. of metal, it will fuse at a high heat and become exceedingly tough and strong. This is the process by which Shortridge, Howell, & Co.'s homogeneous metal is made. In comparison with experiments on wrought-iron, it resulted that weight for weight homo-metal possesses more than double the strength and tenacity of the best wrought-iron, and there is little doubt, therefore, that it will eventually be very largely employed.

Among the more extraordinary innovations upon modern styles of engineering and architecture, as more especially applied to the construction of roofs, is that of the new Midland Railway Terminus about to be erected in St. Pancras, of which we have given some particulars. With the exception of the construction of the vaults, which will alone form a stupendous work in masonry, the whole of the station and roof will be of iron. The length of the station will be 690 ft., with a clear span in width of 240 ft. The side walls will play no part whatever in sustaining the roof, and are built outside it, hiding that portion of the iron work which shows just the commencement of the spring of the iron main ribs from the ground. With the exception, perhaps, of the new Cannon-street Station, there is an ever-present inherent danger in iron arched roofs resting on side walls, for unless the walls are made exceedingly costly and massive, as in the case of the Cannon-street Station, they are likely to affect the stability and set of the superstructure. It is, therefore, more judicious to construct them altogether of iron, where this can be economically carried out without impairing the efficiency of the design. In the case of the roof of the Dublin Exhibition, a novel and ingenious design was effected to divert the lateral

thrust of the roof, which superseded the use of the vertical cross-bracing, as introduced to stay the walls of the International Exhibition in 1862.

The thrust of the arched roof is conveyed by the buttresses to the second-tier columns, which are strongly secured to the small arched-roof girders, and connected at the bottom to the first-tier columns. This arrangement causes a transverse strain on the columns, to resist which they are made thicker on the sides exposed to this strain.

The first-tier columns are again firmly connected to the transverse bracket-girders at the top, and to girders under the floor-level. A proper examination of the iron portion of the Dublin Exhibition would offer an important study to those engaged in iron architecture, as most of the engineering details are of an altogether new and interesting character.

VIENNA IN THE NINETEENTH CENTURY.

THERE is perhaps not one branch of the liberal arts and sciences cultivated in the *Kaiserstadt an der Wien*, as the Viennese call the "imperial city on the Danube," that has made greater advances during the last twenty years than architecture. The political revolution of 1848 was accompanied by a social one. After the conclusion of the thirty years' war the Rococo style, as practised by Martinelli, Fischer von Erlach, and Lucas Hildebrandt, became a favourite, as is visible from the palaces, churches, and other public buildings of that period still extant. At the beginning of this century the style of architecture reverted to the classical, of which the great protagonist was Peter von Nobili, at that time president of the Imperial Academy of Arts and Court Architect, who designed and executed the severe Burg-Thor, the Temple of Theseus in the Volksgarten (an exact copy of its prototype at Athens), and other buildings of that class. His successor inclined more to the Jesuitical style, but it was the great political storm of 1848 that has had the largest influence on the taste of the Viennese for architectural beauty. This was first displayed by suspending the building of the Lerchenfeld church and then completing it in the Romanesque style. In consequence of the new political organisation of the monarchy fresh life and vigour were instilled into the public mind at Vienna, requiring more air and space for their full development, and this was most easily obtained by removing the old and useless ramparts and bastions surrounding the inner city, and filling up the moat that had not been filled with water since the last wars with Turkey and the threatened siege of Vienna by barbarous Asiatic hordes. When that danger passed away, the moat was cultivated as garden-ground and planted with stately rows of poplars that in course of time had reared their heads far above the level of the glacis, and were nearly on a line of height with the lofty bastions that frowned over them.

By these means alone was it possible to gain such a noble area as the eighteen millions of square feet (equal to about 414 English acres), and that, too, in the very centre of the city, which is surrounded by its thirty-four extensive suburbs, that have been made available for building purposes. A new quarter has sprung up, containing many spacious streets, the principal one of which is the Ring-strasse, with a length of 13,000 ft., and a uniform width of 180 ft. We directed attention to this movement, and gave some illustrations of the buildings in our papers "Going Along" (vol. xxii.).* As the land was all Government property, the Emperor has, no doubt, made a successful speculation, for the ground has been sold at enormous prices; but, at the same time, it must be confessed that his Majesty has behaved very liberally, having given away to the municipality, and other corporate bodies, sites for a new hôtel-de-ville, the Horticultural Society's Gardens, the Musical Society's Concert-hall, the Artists' Club-house, and an area of 295,000 square feet for public gardens and a park. This was in 1858, and the impetus thus given to building speedily extended to all other parts of the metropolis, where new buildings, both public and private, have sprung up in all directions, showing the vigour of private enterprise, and exhibiting specimens of almost every style of architecture, though that of the Renaissance greatly predominates, being adapted for modern private residences of the wealthy and even middling classes of society.

Among the many new buildings that deserve special notice may be mentioned the votive church of St. Saviour, close to the Schotten-Thor, erected as a memorial of gratitude for the escape of the present emperor from the dagger of an assassin, from the designs of the architect Ferstel, and of which we have given a view. It is now being roofed in, two millions of florins having been hitherto spent on the work. The two Gothic towers at the western end are to be carried up to a height of 300 ft. The parish church of the suburb of Weissgerber, was designed by Professor Friedrich Schmidt, and executed at the estimated cost of 450,000 florins (about 45,000*l.*) raised partly by voluntary donations, and partly from the funds of the congregation. The tower, when completed, will be 240 ft. high. Opposite the new Mercantile Academy, in the Ringstrasse, a splendid building is being erected for the conservatory of Music, from the designs of Theophilus Hansen, a Danish architect, formerly in the Greek service, and the builder of the Observatory and other public edifices at Athens. It contains a music-hall, covering an area of 2,000 square feet, surrounded by galleries, the whole capable of affording sitting accommodation for 2,000 persons. Besides this, there is a smaller concert-room, for six hundred persons, a suite of ball-rooms, localities for the directors and officials, and twelve school-rooms for the musical pupils. This building, when completed, will have cost 300,000 florins, or about 30,000*l.* The Artists' Club-house, now in course of construction, promises to show much taste and elegance. It was designed by Friedrich Stache, the president of the Society of Architects at Vienna, and the site, as above stated, was a present from the Emperor. Prizes having been offered for the best designs, the chief premium was awarded to Herr Stache, and the execution of the works entrusted to his care. The new terminus of the Northern Railway Company is a spacious and imposing building, covering an area of 100,000 square feet. The chief platform for passengers is 444 ft. long and 102 ft. wide, flanked at each corner by square towers. It was commenced in 1859, from the designs of the company's engineer-in-chief, Herr Ehrenhaus, and has been lately opened, the works having been executed by F. Hoffmann. Great ingenuity is displayed in the construction of the iron arching of the roof over the great platform. We cannot conclude this description without noticing a noble edifice in the new city park, called the Kur-Salon, and devoted, as the name implies, to the sale of medicinal waters. It is a striking object and cannot fail to attract the attention of strangers: it is built in the Renaissance style. It was designed by Johannes Garben and executed by him at the expense of the municipality, the estimated cost being 310,000 florins, or about 31,000*l.* In the central building is a magnificent saloon, containing an area of 3,600 square feet, whilst one of the wings is fitted up as a suite of refreshment-rooms and the other for the sale of mineral waters, which are always in great request at Vienna, and extensively consumed by numerous real and imaginary invalids.

* See also notice of the new Boulevards, in vol. xxiii., p. 411.

EXCAVATIONS AT ARDEA.

AMONG the most singular of social, not to say antiquarian, curiosities are those desolate sites of once renowned and classic cities on the almost uninhabited sea-coast, presenting scenery so characteristic in its mournful monotony, as that once known as Latium Maritimum, now as the Roman Maremma. To those for whom sympathies with humanity transcend all interests of the *dilettante* class, the indescribable wretchedness and hopeless stagnation found in the poor populations here bound by circumstance to the soil, are realities to leave deeper impression than the monuments of nations, more melancholy than records of vanished greatness; and it may be well doubted whether in all Christendom (at least in Western Europe) can exist at the present day anything analogous to these examples of living decay in the Papal States. Yet in such gloomy pictures there is also the brighter side presented by the simple manners, patient endurance under misery, and, we believe, generally innocent life of these impoverished peasant families, to whom the lines have fallen amidst historic ruins or things of classic association. A visit to Ardea, the capital of the Rutuli, ancient before the Rome of Romulus had birth, and invested with a light of poetic memories through the genius of Virgil, is not one of the least instructive or least worth the tourist's time. Among pleasant excursions to historic spots now facilitated by the railway lines that pass below the Alban Hills, through the country of the Volsci and Hernicians, a ride of twelve miles from Albano takes us across a wide Campagna extent of low downs and plateau-surfaces that gradually subside to the level of the sea, through a desolate landscape, of character beyond description melancholy, suggesting the idea of some mysterious and irretrievable blight, against which no civilization can struggle. But that monotony is varied here and there by the old rambling *tenuta* (farm) with high grey walls, buttresses, and sometimes a tower shooting up from the heavy quadrangular pile, or by the more conspicuous square tower of Mediæval antiquity, long desolate, in some examples of stupendous height, and strikingly conspicuous amid the level waste or low undulating region, like motionless wrecks on a frozen sea. This landscape becomes more cheerful and picturesquely broken up as we advance south-westward; long narrow glens with flat meadows shut in by low rocky boundaries, and scattered clusters of ilex-trees, beginning to present contrasts pleasing after that dreary extent previously traversed.

From a distance of five or six miles Ardea becomes visible, like a cluster of old farms and granaries scattered without plan along a steeply-elevated plateau. At last, when within a short distance, this city's forlorn site is presented to view with singular and striking effect. Along the summit of a precipice that rises abrupt as a line of fortifications, appear a few remnants of antique walls in the massive masonry, with quadrate and regular stone-work, that reminds of the Roman kingly period, interspersed with some still available, though dilapidated, Mediæval defences; above these, a few ponderous piles of dusky grey building and some miserable cottages; central, where an indenture opens like an artificial breach in the rock fortifications, an arched gateway of the same ancient stonework, apparently thrown up by modern hands with inferior skill. Passing through this, we find ourselves, not in a street, but at the end of a narrow ravine sloping upwards between rocks.

Not a human creature was visible, not a sound heard to indicate life at the moment we passed into this silent circuit. Presently, however, we obtained the guidance of a peasant, who looked in about the last stage of *malaria* fever, yet with a good expression in his sallow, wasted face; in his manners pleasing, as well as eager to oblige. Led by him, we first visited the church, a building of some good external features, with an apse and cornice-work of terra-cotta, in style like the twelfth-century work in Roman architecture; the interior less remarkable, and evidently deprived of one aisle, that, if not once existing, must have been projected. The most conspicuous mansion is a grim and spectral-looking villa of the Cesarini princes, now seldom inhabited even by servants, approached by a bridge across low arches, and on the other side fenced by those Mediæval battlements so conspicuous above the rocks. Even here, however, is found a little establishment pretending to be of the *café* species, and a strange sort of den serving as an *osteria*. We passed over the rocks that supply the place of pavement, descending into the ravine at the eastern end of the isolated height, once the acropolis, and now alone occupied by the modern Ardea. Here was presented a wildly lovely scene, amid which rose in dark decay the principal remains of the antique city, consisting of lofty walls in regularly hewn stone, the reddish brown lithoid tufa, in part evidently rebuilt with their original material, but with far less regularity; elsewhere not less evidently, the unshattered relics of a nationality and metropolis more ancient than Rome. Out of an angle of these fortifications advances a ruinous square tower, in similar stonework, but built up in style very inferior,—no doubt a Mediæval adjunct. Beneath runs a wild pathway, winding among low rocks and thickets, and amid such a scene the effect of those antiquities is romantic, with a touch of solemnity.

Hearing from our guide that excavations had at intervals been undertaken by Prince Cesarini, though abandoned of late years, we set out to visit what he described as the chief object thus brought to light. We walked at least a mile;

first, along a road leading to Porto d'Angio, through scenery possessing a certain charm, a fair wildness, with meadows and copses, and glimpses of the sea through the scattered forest-growth along an uninhabited level coast. Leaving the road, to wind round the grassy slopes of a hill, we presently reached the entrance of a tomb, quadrate and so low as to require much stooping, central to a front hewn in the living rock, with some attempt at architectural forms. Passing in, we found a chamber not too extensive to be throughout illumined by the daylight admitted by that narrow doorway, with a flattened arch for ceiling, and walls covered with stucco still perfect; and, along one side, two platforms large enough for bodies, where had been discovered two perfect skeletons; besides which, when the tomb was first opened, were found two marble sarcophagi, with their covers perfect, bearing inscriptions, but no sculptures, on their exterior—now in possession of the Cesarini family, and, alike with the skeletons, removed from this sepulchre,—a spoliation for the visitor to regret. Two much smaller chambers communicate with this outer one,—the narrower of these parallel to it; the other entered by a low ingress at one end. In these, also, are similar platforms for funereal use; and in each interior we see some few remnants of red and blue colour, forming a simple species of border (in one part of the guilloche style, designed in blue) on the stucco. In the outer chamber those marble sarcophagi were placed on the ground, not, like the skeletons, on platforms; and these two modes of entombment must be referred to different epochs.

As to arrangement for the deposit of the dead, these sepulchres resemble the Etruscan; but are much inferior in their ornamental details, nor less so in the formation, alike fashioned, according to both systems, in rock instead of masonry. At different other points, on the same hill-side, we saw where excavation had been just initiated, but soon discontinued as fruitless—nothing, indeed, bearing proof that such projects had been pursued persistingly, or on any large scale; yet the report of our guide, that in tilling the ground he himself and other labourers were constantly finding remnants of construction, showed that no very great efforts would be requisite for securing some result for the excavator's reward.

We are told by Gell, that it was in preparing one of the maps for his valuable work, "Topography of Rome and its Vicinity," that was first verified the extent of the ancient Ardea, at least six times that of the elevated ground over which is strewn the modern village, this being, in fact, the site of the citadel alone, whose principal buildings probably stood in the place of the Cesarini mansion, on the most prominent height, commanding the country towards the sea. Besides the objects above noticed, the sole recognisable features of antiquity here are not, indeed, constructions, but traces of man's work, in adapting the ground to the purposes of a fortified place. The narrow valley that runs round the now-inhabited height forms a natural moat, as the rocky walls rising from this hollow exactly represent a system of strategic defences. Another high table-land, supported on a rocky cincture more extensive than that of the citadel, runs beyond this valley eastward; and under its precipices are some portions of wall in the reticulated masonry well known as of the Roman Imperial period, this elevation being alike surrounded by the sinuous valley, here also serving as a moat. On the other side, towards the sea, is a similar mound, with a rocky cincture, less lofty, and overshadowed by trees, a most picturesque accessory to the scene; and here the rocks are cut into numerous caverns, like sepulchres, suggesting that this site may have been the acropolis, though, indeed, the frequency of like excavations on the hill-sides and along the rocky cincture beneath the citadel itself, leads to suppose that many were formed for other purposes. Some, the more spacious, we must infer to be quarries, from whose material the city was built. We had a study of social life before leaving Ardea, enjoyed in the *osteria* where we obtained refreshment,—home-made bread (no such thing as a public bakery being found here), eggs and cheese, pears and peaches, with palatable wine served to us, in a strange interior like a cavern, though veritably a spacious room lighted only from the doorway, with walls and rafters begrimed by smoke to one sooty tint, and a heap of stones under a high gaping chimney at one corner, available as a fireplace. But not even here was wanting the Madonna picture, painted in tawdry red and yellow on the smoked wall-surface, with its little lamp (not, however, burning) before the figure, like a doll wearing a crown. Our guide and the man who had accompanied us from Albano, with a few other wild-looking but handsome peasants, who ate and drank without speaking, were regaling themselves in the same room; our landlady and waiter being a pretty, smiling woman, with braided hair like a raven's wing, and large gold earrings; evidently, indeed, the life of the establishment, though she had an old husband, who sat silently by the fire. Ardea's present population is, at its maximum (but this we were told in a rather hesitating tone), about 200, but much less during the summer, when *malaria* is the scourge of this coast. Inquiring as to the heat felt here compared with that of Rome, we were answered in a tone that ridiculed the idea of any analogy between two such climates: Rome had the cool summer; *here* only did people know what was heat; and on many a day of that season none, we were told, could go abroad. It surprised us to hear of the spiritual destitution of a place only twenty-two miles from Rome;—to be told that no clergy reside among this poor flock, whose conditions assuredly call for whatever influences from a higher class might enlighten or elevate above the dreary level of work-day existence in such circumstances.

This now indeed fallen city is said to owe its origin to an Argive colony, descended from Danaë ("Æneid," vii., 408). Strabo gives to Ardea the epithet "ancient," and Virgil speaks "Auruncæque manus, Rutuli, veteresque Sicani." It may be inferred that its people, the Arunci and Sicani, were nearly connected, perhaps tribes descended from the same stock. It is in the pages of the great epic poet, rather than in those of any verified history, that Ardea stands out, vivid and potent, before the mind's eye, as capital of the nearest hostile prince, the rival of Æneas in love and warfare. Till the time of Tarquinus Superbus, it seems to have continued a town of some importance, and was besieged by that king, from motives of mere avarice (Liv., l. 1, 58); on occasion of which Roman onset, or rather encampment, during the blockade before her walls, it was that the question arose as to the virtue of their wives between Sextus and Collatinus, with such fatal result in the outrage suffered by Lucretia, and the revolution terminating in the overthrow of kingly government at Rome. Under that city's supreme dominion, Ardea seems to have submitted with little resistance; and so soon did her decline begin, that even in the sixty-seventh year of the Republic, U.C. 312, a colony was sent hither from Rome to repeople the town, already becoming deserted.

Juvenal (Sat. xii.) mentions the droves of elephants kept by the emperors for the spectacles of the amphitheatre, on the meadows near Ardea. Pliny also speaks of these animals (Nat. Hist., l. viii.); and notices the more interesting fact that some pictures were in good preservation, though more ancient than the foundation of Rome, in the Ardea of his time.

Another version of the legend of Ardea given by Dionysius, is that it was founded by one of the three sons of Ulysses and Circe, who gave to this town his own name; and Ovid (Metam. xiv.) adds the poetic fable of a bird springing from the ashes of the city burned down by Æneas, after the death of Turnus, to be known in Latin ornithology by this local name,—

"—— nomen quoque mansit in illa
Urbis: et ipsa suis deplangitur Ardea pennis."

In the year of Rome, 541, this town was one of the twelve colonies which protested disability to furnish the required supply of troops and money for the consuls; in punishment for which the Senate ordered that all those recalcitrant towns should be considered as no longer existing—a *tacita castigatio*, as Livy says, truly in old Roman style. We read in Frontinus, *de Coloniis*, that Hadrian made one of his benevolent attempts to infuse new life into this as into other decayed cities of the Roman *ager*—it seems with no permanent success; and thenceforth began the decline in which Ardea gradually passed away from the historic page. It is assumed by Nibby, that her present utter desolation is due to the incursions of Saracens on this coast, in the ninth and tenth centuries; besides also the influences ascribable to the *malaria* here most pernicious. Pliny mentions the principal temple of this city, dedicated to Juno Regina, and adorned with pictures by Ludius (l. xxxv. c. 3).

THE GAS SUPPLY OF PARIS.

AT the Society of Arts, on Wednesday evening last, Mr. George R. Burnell read a paper on this subject, Mr. Bazalgette presiding. We print the more salient portions of it. Amongst the wonderful adaptations of physical science to the daily usages of life, said Mr. Burnell, there is hardly one which is calculated to excite greater attention than the application of carburetted hydrogen gas to the purposes of illumination. It is essentially a discovery of modern times; for there must be many here present who can recollect the "darkness visible" that enshrouded London streets in the days when oil-lamps were in vogue; but we get so soon accustomed to the enjoyment of luxuries, that very often the first steps that attend their acquisition are forgotten, and we take them as matters of course. Somewhat of this kind of reasoning has been adopted with respect to the use of gas; and the public are inclined to expect that the manufacturers of this article, which has now become almost a necessity of life, should give them the benefit of their experience, without taking into account the cost they must have incurred in acquiring it. The discussions that took place on the occasion of granting the new concession for lighting the city of Paris, and the movement that is at present going on in our own metropolis, seem to have been marked with this spirit; and though the Paris Gas Company has succeeded in obtaining what may be considered as favourable terms in return for the supply of gas, yet the inhabitants of London evidently are disposed to expect that the companies should supply them at such prices as would hardly leave them a fair profit. It therefore struck me that a statement of the conditions under which the Gas Company of Paris have contracted to supply the town with that article of consumption might be of interest, if only to enable the engineer to compare the systems adopted in the two countries with respect to public works; the more especially as it would appear that considerable misapprehension exists with respect to the rights and privileges of our neighbours in this particular matter.

The formation of the one gigantic monopoly that has the privilege of lighting Paris took place in this manner. There had been several companies, that were formed for the supply of the city, which had, from the period of their first establishment, enjoyed a species of districting arrangement, as we should call it, and they agreed to merge their separate capitals in the six companies that had treated with the municipality in the month of December, 1846. In the year 1852, when the empire was first established, the Government thought it to be its interest to encourage the formation of great companies who should possess the means of employing large numbers of workmen, and give rise to the profitable investment of capital. The hygienic effect of the establishments for the manufacture of gas in the interior of the city also weighed with the Government; and they were desirous that at least three or four of these should be removed from their original positions in the centre of the town. Under these circumstances it was suggested to the shareholders of the six companies that their union would be received with pleasure; and then that their application for the prolongation of their concession, that expired at the close of 1863, might be entertained upon conditions that were to be the subject of future deliberation. The consequence of this proceeding on the part of the Government may be described, in substance, to have been that the concession for lighting Paris was granted to the united companies on these terms. The three establishments in the interior of Paris, at the Avenue Trudaine, the Rue du Faubourg Poissonnière, and the Rue de la Tour du Temple, were to be suppressed, and their manufacture was in future to be conducted in the new gas station that was to be erected at La Villette; the canalization of the interior of Paris (understanding by that term the lines of mains and distributing pipes) were to be altered, and made so as to correspond with the probable future demand upon them; the company agreed to pay the town the sum of 8,000*l.* for the privilege of laying their pipes in the public ways; also it agreed to pay the town two centimes a mètre cube, or about 5½d. per 1,000 cubic feet, as a compensation for the *octroi* dues; it moreover agreed to share the profits of the working above 10 per cent. with the municipality of the city of Paris after the expiration of the first sixteen years.

The material and plant that were employed,

and all the land and buildings devoted to the manufacture, were to remain the property of the company at the expiration of the lease, which was fixed at fifty years from the 1st of January, 1856, and the company bound itself, in the meantime, to alter the position of their mains, &c., whenever the town might require to execute works for the water supply, sewerage, &c.; so far, indeed, has the lease foreseen the probability of future operations of this nature, that it provides for the company's removing their pipes into any subways that the town may construct, without thereby giving rise to any claim for compensation. For these terms the company agrees to supply gas for the public lighting at the following prices:—There are three sets of flames, that are respectively 2¼ in. wide by 1½ in. high, which is paid per hour 0·015 f.; 2⅜ in. wide by 1¼ in. high, which is paid per hour 0·021 f.; and 3 5/16 in. wide by 1 13/16 in. high, which is paid per hour 0·030 f. When the gas is sold to the town by mètre, it is paid for at the rate of 0·15 f. the mètre cube, or about 3s. 4½d. per 1,000 cubic feet; the company is obliged to fix, paint, and repair the lamp-posts and candelabra, but the town furnishes them. For private consumption the company was entitled to charge for the gas supplied at the rate of 0·30 f. per mètre cube, or about 6s. 8¾d. the 1,000 cubic feet, upon agreement of three months' date, terminable at the option of either party; but the parties so receiving the gas cannot employ it without the production of the certificate of the person employed by the town to examine (and who exercises the right of approving) the fittings and other apparatus.

It was stipulated that if, during the period of fifty years, for which this lease was granted, there should be discovered any new system of lighting, the gas company should be bound to introduce it, under conditions that were to be fixed by the municipality; or the municipality reserved to itself the right of granting a fresh concession for the new system of lighting, without being bound to compensate the company in any way whatever. The quality of the gas is provided to be such that a lamp of the first series mentioned, which would consume 100 litres per hour, should give a light equal to 0·77 of a carcel lamp burning 42 grammes of rape oil in the hour; for the lights of the second category, burning 140 litres an hour, the light is to be equal to 1·10 of that above given; and for the lights consuming 200 litres in the hour, it is provided that they shall yield 1·72 of the light of a carcel lamp as described. It may be stated that this standard corresponds very nearly with the English one, of what we should call seven-sperm-candle gas.

To enable any one to appreciate the position that the company occupies under this contract, it is necessary to observe that the coal used in Paris is mostly of Belgian and north of France origin; a small portion of cannel, or boghead, is only introduced when the illuminating power of the gas is below the standard. The average yield of this coal is about, per hectolitre (according to the figures that were published by the company in the course of the discussion that took place before the treaty was signed), gas, 22·94 mètres; large coke 31·11 kilogrammes; breeze, 12·07 kilogrammes; tar, 4·50 kilogrammes; and ammoniacal liquor of the value of 0·036 francs. The quantity of ammonia compounds that are present in the coal is considerable, and the company is obliged to exercise great precaution in insuring the purification of the gas, in order to comply with the clause in their treaty which provides that the means they adopt for that purpose should be the best that are known. Yet with all these drawbacks upon the commercial results of the operation, the Paris Gas Company has always paid a good dividend, and the last distribution of profits was at the rate of 19 per cent.; whilst the average rate appears to have been of about 16 per cent.: a result that would cause great heart-burnings with the municipal reformers and the political economists of our own country, who will not allow any company to divide more than 10 per cent. The capital that is invested in the works consists of share capital 4,000,000 francs, and of bonds of the company about 20,000,000 francs; or, in all, about 4,160,000*l.*, for a total population of 1,600,000 persons, which would make the rate at which the gas service of Paris is performed about 2*l.* 10s. per head of the inhabitants. This calculation, however, is somewhat in excess of the facts of the case, as the gas company has lately undertaken to supply some of the external villages of the Department of the Seine, such as Romainville, Puteaux, Charville, St. Denis, Maisons Alfort, &c., which form the subject of a separate treaty; but the above calculation may be taken as representing the proportionate price that is incurred in this service. It may be added, that the price that is agreed to be paid by the communes beyond Paris for the lighting is, for the public lamps, 20 centimes per mètre cube, or about 4s. 3½d. per 1,000 ft. c.; for the private lighting, 40 centimes per mètre cube, or 8s. 7d. per 1,000; upon a descending scale that may reach, finally, 6s. 8¾d. per 1,000, in proportion to the consumption. The high price that is agreed to be paid for this service may be explained by the length of main that is unproductive to the company in these cases; but it certainly seems to be exorbitant, when the freedom of the gas from *octroi* dues and other municipal taxes is taken into account.

It may be remarked that the system of regarding the supply of the gas consumed in Paris as a municipal service, has entailed upon the private consumers the necessity of paying a higher price for the gas that they consume than they would naturally do if the service were left to be regulated by the ordinary rules of trade. The municipality, in the exercise of its rights over the surface of the roadway in fact, has only consented to grant the monopoly of the gas supply to the company on the condition of their supplying the public lamps at reduced rates, and of sharing in the profits of the concern after it has been established such a time as is sufficient to relieve it from any chance of failure. It is true that, in this manner, the town authorities will be enabled to devote a portion of the profits arising from the sale of gas to the relief of the other taxation of the town; but this is only an indirect way of making the consumers of gas pay for the water, paving, or other municipal services; and it is objectionable, as the control of those services can never be efficiently performed so long as the total expenses of them are not distinctly brought under discussion.

At present there may be found a great amount of the ammonia compounds in the gas, and it is rather deficient in the illuminating power when compared with the London gas, but this may be owing to the quality of the coal that is used. The effect of the participation of the town in the profits of the company must, however, be such as to superinduce a carelessness on the part of the *employés* who are charged with the verification of the quality of the gas, and of the means adopted for ascertaining the quantities supplied. There is now apparently a great deal of anxiety displayed by the town authorities about the illuminating power and the purity of the gas, for they have organised a complete system of control and superintendence of both the public and private lighting, that appears, at first sight, to be most efficient. There are twenty-one persons who are constantly employed in testing the gas, and who are paid at salaries varying from 200*l.* a-year to 48*l.*, the total sum voted for the wages of these people for the next year being about 1,060*l.*: there are also 130 inspectors of the public lighting, at salaries varying from 200*l.* a-year to 48*l.*, who figure in the town budget for a total sum of 10,480*l.*; and thirty-two inspectors of private lighting, who are charged with the verification of the meters: these are paid salaries varying from 240*l.* to 40*l.* a year, and they figure in the budget for 2,600*l.* The superintendence of this service is, theoretically, very well arranged; it remains to be seen whether it will really operate for the protection of the inhabitants, when the town has a direct interest in the successful results of the company, which it will have when the period of sixteen years, during which the company has the enjoyment of all it can make, shall have expired.

There are in the neighbourhood of Paris, and within the lines of the fortifications, ten gas stations, of different capacities, but all subordinate to the great station of the Villette. These stations are—1. La Villette; 2. Les Ternes; 3. Passy; 4. Vaugirard; 5. Ivry; 6. Chartronne; 7. Belleville; and the three that are situated in the surrounding communes of St. Denis, Boulogne, and Charenton. As was said, the station of La Villette is the most important of these; it suffices for the manufacture of one-third of the gas that is consumed in Paris; the stations of Passy and Vaugirard supply together almost another third; and the other stations contribute about equally to the total consumption. The distribution of the gas from the reservoirs takes place under the pressure of rather more than 1½ of an inch during the day-time, and in the night-time of 3¾ to 3¾ of an inch. It may be that this pressure may be required to overcome the difference of level of the factory, which is somewhat above the points of delivery in Paris; or it may be accounted for by the small dimensions of the distributing means. The efforts of the company are, however, directed to the remedying this cause of loss, which must always, to a certain extent, act to prevent the due proportion between the mains of distribution and the quantity of gas they would discharge in a given period of time being observed, owing to the interest the company have to continue their working through the pipes that they are bound to yield to the town at the expiration of their lease. By the peculiar arrangements adopted, the Paris Gas Company has reduced the loss that ensues from the excessive pressure that accompanies the distribution of the gas to a minimum. We shall have occasion to revert to this subject; but it may be as well to state that the loss of the gas registered by the station meters, both in private consumption and in public lighting, was, in the year 1864, only 10 per cent.—a most insignificant proportion, if the quantity that is lost by the condensation in the mains, the amount that is not carried to account by the private consumers, and the thousand causes of loss that the gas must be exposed to, are taken into account. The average loss of the London gas companies is at least from 15 to 25 per cent. of the quantity they register at the stations.

It is calculated that the total yield of La Villette station is about equal to five millions of cubic feet per day when the works are in full operation; and the distribution of this quantity takes place in the busiest and most bustling part of the town. The other works do not present anything very particular, excepting perhaps the station at Vaugirard, which is specially reserved as an experimental station, and where the company have been at work for the last three years upon Mr. Siemens' system of economising the heat that is employed to produce the distillation of the coal; hitherto without success, it must be observed. The Paris Gas Company, by their monopoly of the supply, are enabled thus to "try all things" that are proposed in the matter of lighting with the best means and appliances that can be disposed of.

The distribution of gas takes place through mains that are of as large diameter as 3 5/12 ft., exactly one mètre; they are all wrought-iron, upon Chameroy's patent, and in that respect the Paris supply differs from that of London, which, in consequence of Mr. A. Taylor's Act, is compelled to receive its gas supply through cast-iron mains. The Chameroy pipes are put together in lengths of 15 or 16 feet; the joints are riveted and brazed; the whole is then coated with a preserving coat of bitumen, and the joints are made with a male screw on one end, and a thickening out, formed on a mandril, to receive a female screw on the other, which is then packed with gasket and white-lead. The opinions of English engineers are unfavourable to this style of pipe; but the experience of the Gas Company of Paris for the last twenty-seven years seems to be decisive as to its merits in all cases where the soil is of an alkaline nature, and is not charged with water. I was informed by M. Camus, the sub-engineer of the works, who is also an engineer of the Ponts-et-Chaussées, that he had ascertained the wear and tear of 1,000 mètres of wrought and cast iron mains of the same diameter, respectively, in the course of the year 1861, and he found that they presented the following results. He found that the cast-iron showed that the proportion of the leakage that was owing to accidental breakage in the pipes was 1·000, whilst that quantity was, for the wrought-iron, 0·460. The proportion of loss through the use of the pipes by time or depreciation was, for cast-iron, 0·353; for wrought-iron, 0·198. The proportion of loss by shaking of joint was, for the cast-iron pipes, 1·77; for the wrought-iron, 0·520. There may be greater care and attention paid in Paris to the repairs and maintenance of the pipes; but the results of the experiments tried in this case seem to indicate that the cause of the diminished loss upon the registered quantity of gas must be sought for in the use of these mains; and at the present day, when so much attention is forcedly turned to the question of the leakage of gas-pipes, on account of the construction of subways by the Metropolitan Board of Works, the subject acquires additional interest. The house distribution also takes place in Paris through lead service pipe, that must be another cause of diminished leakage; but the private consumer is at liberty to employ whatever system he may think proper after the

passage of the gas through the meter. From the report of the gas company to their shareholders last year, it appears that the total consumption of gas in Paris was about 3,567 millions of cubic feet, for a population that was estimated at 1,650,000; and the company had, in their prevision of an increased demand, increased their manufacturing powers to 4,141 millions. The length of pipes that were employed in the lighting of Paris was 546,861 mètres; that of the annexed zone, of 424,985 mètres; that of the banlieue and the surrounding district, 165,346. The number of public lights supplied by the company for the account of the municipality was 26,849; the number of private subscribers was 59,554, in the year 1863, the last for which I have been able to procure the returns. It may be added, that the lamps that are used for the lighting of the Boulevards are placed at distances of 25 mètres apart on the same line; in the Rue de Rivoli they are about 14 ft. apart; in the courtyard of the Louvre they are about 20 ft. apart; the burners being, in the majority of cases, at 10 ft. above the pavement. The lighting of Paris is, in fact, most brilliantly and lavishly executed, in the best quarters of the town at least; it leaves, however, much to be desired in the poorer portions, which are about as badly lighted as the analogous parts of London.

I have mentioned the desire that the public seem to have at present for the laying of the pipes in the subways that have been constructed by the Metropolitan Board of Works, and have hinted at the provisions that have been introduced into the treaty that prevails between the City of Paris and the gas company, with the object of facilitating the placing of the pipes in that manner. The treaty contains, indeed, a clause to the effect, "that the town reserves to itself the right to displace, and even to remove altogether, at the expense of the concessionnaires, and without any indemnity, the pipes every time that it may think the public interest may require it. If it should suit the municipal administration, during the continuance of the lease, to relieve the public ways of the excavations necessary for the laying of the gas-pipes, and to dispose the sewers so as to receive them, the concessionnaires shall be bound to remove their pipes to the positions prepared for them, at their own expense, upon all the points where the city shall have executed the works for this purpose." Yet with this precaution and this right, the city of Paris does not think of calling upon the gas company to remove their pipes; nay, the water-pipes are in Paris carried into the sewers, which are there rather subways than simply sewers, and the engineers of the city most energetically oppose the introduction of the gas-pipes into them. Experience has shown that there are fatal causes at work to produce the explosion of the escaped gas in these cases, which all the care of the engineers cannot guard against. There have been three accidents, as M. Belgrand informed me, in the gallery of the Rue des Martyrs; there have been two accidents in the court-yard of the Louvre; and the accident that took place last year, the consequences of which I myself saw, on the bridge of Austerlitz, was a fatal commentary upon the danger of the system of laying the gas-pipes in subways. In this case the pipes were carried over the haunches of the bridge in a gallery that had an entrance at either end, that served as a means of ventilation, and it had a means of escape in the middle; the gas was shut off at both ends, and the quantity there was in the pipes allowed to burn off; yet an explosive mixture was formed, and it was set on fire, probably by a workman throwing down a match. Fortunately this occurred in the early morning, and the few people that were passing the bridge were attracted to the side where they could witness the passage of a steamer that happened to be passing; there were consequently no passers-by injured, but two workmen were killed, and several others were carried off to the hospital; the whole length of the pavement of the bridge was blown up for the length of 180 mètres, or 200 mètres, and about 12,000 francs worth of damage done to the bridge. M. Belgrand was, in fact, quite borne out in his opinion, that "in no city where there was anything like a regard for human life, would the notion of carrying the gas-pipes in a covered way be for an instant tolerated." He had, it must be observed, more than eleven years' experience in the Paris subways, and yet, with all the advantage of the most careful superintendence by the agents of the Ponts-et-Chaussées, and the effect of the French law of compensation for accidents, to enforce the observance of the necessary precautions, he did not scruple to come over here to London to give evidence against the scheme of the Metropolitan Board, that is again brought before the public with so much persistency. The fact is, that without a regular system of ventilation, that would entail an enormous outlay, there cannot be any safety in the system of subways as applied to gas-pipes; and the Metropolitan Board do not seem to have contemplated the execution of even the smallest precaution for this purpose.

The Paris Gas Company is managed, as all the important operations of that country of a similar nature are, upon the strictest principles of discipline, order, and superintendence. The administration is composed of a certain number of directors, who are chosen from the body of the shareholders, generally speaking from amongst the original proprietors in the various gas companies that were amalgamated together, and they are assisted in the management by M. Gayffier, ingénieur-en-chef des Ponts-et-Chaussées, and M. Camus, ingénieur-ordinaire of that body, who have under their orders a numerous staff of engineers, chemists, practical men, and clerks, that would frighten any English board of management. Thus the expenses of the salaries to the various people employed in the factory, in the maintenance and laying of the mains, and in the office of the company, was not less than about 88,000*l.* in the course of the year 1863; but at this charge the service is performed with a degree of perfection that we in England have no conception of. The cost of every detail of the manufactory is known to the last centime; the waste that attends the operations of the London companies is unknown; the accounts are kept in the most elaborate manner, and the gas company provide for their own servants with a liberality that we in England have no example of. The result of the system is, that in Paris the gasworks are managed at about 58 per cent. of the total receipts, which may be accounted for by the fact of the great success of the speculation that the directors manage, and by their having no inducement to introduce any great economy in their working in consequence of the participation of the town in the profits of their concern after a certain time. There is, indeed, every inducement for the directors to indulge in expense in the management; none to induce them to save; and as the city of Paris has also a direct interest in knowing the cost of every detail of the fabrication of gas, it is questionable whether at any time the *frais d'administration*, or the office expenses, will be much decreased. This is certain, that the Paris Gas Company is managed with consummate skill; and though we in England would do very unwisely, as I think, to adopt the system that prevails in the neighbouring capital with regard to the supply of gas—because it is founded upon principles of political economy which are, I think, wrong, and it would involve an interference with our private habits, which I think would be intolerable,—yet there are many things that seem to be well deserving our study, and our imitation, in the manner the Paris Gas Company carries out its contract. The system at Paris is, in fact, designed for the atmosphere of France; it would fail if introduced here, where "every man does what he likes in his own eyes."

At the close of the paper a discussion ensued. We give a report of it under another heading.

GAS PIPES AND SUBWAYS.

AT the termination of the paper on the Supply of Gas to Paris,—

Mr. Godwin said they must be much obliged to Mr. Burnell for his admirable paper. Some important facts had been brought before them in a very interesting manner, but he was not able himself to agree with that gentleman in what appeared to be his leading object in the paper, viz., that it should make us more satisfied with what was done for us in England. It was not likely that Englishmen would put up with such a preposterous arrangement as was made for the inhabitants of Paris. The notion of tying the inhabitants down for fifty years to take this gas at 6s. 8½d. per 1,000 ft. (with allowances and deductions), notwithstanding any inventions and arrangements for cheapening it that might arise, seemed perfectly ridiculous. It was true if any new mode of lighting were introduced, the municipality could call upon the gas company to put it into practice, or could do so themselves without making compensation. After all, however, the people of Paris at that moment paid very little more for their light than in London. He was assured, on the best evidence, that the light there was much superior; in other words, that a certain number of cubic feet of gas in Paris gave more light than the same number of feet of the gas of many of the London companies, who, even at the present day, supplied an article that was very far from satisfactory. It was true the municipality of Paris partook of an advantage to the extent of 5½d. per 1,000 ft. and divided the profits beyond 10 per cent. after sixteen years; but thus they had an interest in keeping up this price. It was not likely, however, that we should permit such an arrangement; and yet we were, perhaps, not much better off with our arrangement than the Paris people. It occurred to him some years ago to initiate a movement against the high price charged by the gas companies in England, and against their management. It went on for a considerable time and was taken up by others, but it brought him nothing but personal abuse, and even such an instance as a man holding a large number of gas shares, at whose house he was visiting, putting a pistol to his head and saying if it were not for the consequences he would blow his brains out, because the course Mr. Godwin had been taking was likely to ruin him and his family. A few years after, that very person derived 25 per cent. more from his shares than he did when that movement began. The gas companies took the usual course of opposing improvements and keeping up the price, but they were forced into a movement which damaged some of the old companies, and this would be the case again if they persisted in their opposition to the gas-pipes being laid in the subways formed for them. He regarded it as idle to say that the escape of gas could not be guarded against. They were told that the escape from the mains was still very great, as was manifest from the state of the soil round the joint of an old gas-pipe; the loss to the companies was great;—the damage to health would be great, by-the-bye;—and in order that they might go on laying down pipes with bad joints and other careless arrangements, they brought forward the evidence of one French engineer to prove that explosions were a necessary consequence of pipes being laid in subways. In the case of Nottingham the system had been carried out without damage, and he was satisfied that this plan was a perfectly practicable one, and it would be a disgrace to the companies if they persisted in opposing its adoption. He spoke from long and careful consideration of the subject. In factories he had seen as much as half a mile of pipes of iron and of softer metal running through the different rooms, but there was no escape of gas, because the joints were properly made. He was satisfied, if the gas mains were laid in the subways, and a proper system of ventilation provided, the plan could be adopted. At present the public were subject to the perpetual annoyance of disturbances of the streets; for example, within three years Long-acre had been almost closed for traffic on five occasions during the laying of gas and water pipes and the construction of sewers. All that nuisance might be avoided by using the subway; and notwithstanding Mr. Burnell's eloquent endeavours, they must persist in pressing this matter on the attention of the gas companies; and if they would not afford the public redress, it was to be hoped the legislature would do so.

Mr. Thomas Hawksley entirely disagreed with the gentleman who had just addressed the meeting. He (Mr. Hawksley) had had thirty-five years' practical experience of this subject, having been the engineer of the Nottingham Gas Works, to which Mr. Godwin had alluded. He would tell them the real facts of the case. The subway at Nottingham was a little pitiful channel, of about 200 yards in length, and the gas-pipe which was laid on it was four inches in diameter, the street having very few houses, and, consequently, there were very few branches from that pipe. It so happened, also, that this little channel had a rise in the short length he had stated of very nearly 40 feet, and consequently it ensured for itself a tolerably good ventilation.* He need hardly say that these were circumstances which did not apply at all to such a place as the metropolis. It was remarkable how great were the apprehensions of the work-

* A paragraph from our correspondent at Nottingham in our present number will show the worth of this observation.

men of the gas company in reference to this subway, for they would not go into it unless the gas was shut off, and even then they used a safety-lamp. They were told that gas had been laid in subways, and that gas had been lighted in them without danger; but the danger was occasioned by the insidious escape of gas by leakage, and when this occurred in any confined space, an explosive compound was formed, which was liable to produce a most serious disaster, particularly in a subway, where the whole street might be bodily raised up, and the passers-by would run the risk of being injured, if not killed. A good deal had been said about the escape of gas in the streets, but he would assert that it did not reach to anything like 5 per cent.; in general it was much less. What was called leakage was simply the loss which a gas company sustained upon the gas, as ascertained, in the first place by the meter at the stations, and in the second by the money which the gas company received. A thousand and one things happened between the station meter and the receipt of the money by the company. In the first place, there was leakage at the works, which was very considerable. In the next place, there was the consumption of gas upon the premises, which was to be counted by millions of feet a year, and which very few gas companies took into account. Then the gas went into the mains, from which there was a very slight escape indeed, and that escape passed into the soil, where it was absorbed without danger. A great loss occurred from the service-pipes, much more than from the mains of the company. That was a loss which ought as far as possible to be prevented, and if gas companies generally used lead pipe instead of wrought-iron for services, as was done in many cases with great success, they would not suffer in this way. The gas eventually went to the meter, which professed to measure the whole that passed through it, but it often did not, and any defect of the meter, whether wet or dry, was against the gas company. Then there was all the surreptitious and fraudulent consumption of gas, which in a great city was not inconsiderable. Then, further, there was the waste in the public lamps, which was greater than any other for this reason: each lamp was a consumer with only one light, and the pipe must be as full of gas for that consumer as for a private consumer using ten or twenty lights, and thus there would be a greater proportion of leakage. All these things put together went by the general name of leakage, whilst the escape from the mains of a well-managed company was not more than 2½ per cent. Mr. Hawksley instanced the case of a gas company in Denmark whose works he superintended, and in which the whole leakage, over a period of three years, did not average 5 per cent., and at Nottingham, before the introduction of Lord Redesdale's Meter Act, the leakage was as low as 8 per cent., but owing to the operation of that Act it had latterly been as much as 14 per cent. The way in which accidents would happen in subways was this:—A gas company alone could not control all the operation of the subway; other workmen would be employed there who might be the occasion of accidents. If the streets of London were generally subwayed, he had no hesitation in saying that with 2,000 miles of subway, there would not be a day without an explosion, if the gas main were laid in them; and it would be impossible, in the nature of things, to prevent this, if they had gas-pipes in the subways. They must have workmen there, and they would also have the London thieves there, to the great peril of the jewellers' shops, which were contiguous to the subways. Passing now to what had been said with regard to the gaslights in Paris, he would say he did not find anything better there than we had at home. The quality of the gas, the mode of manufacture, the amount of production, and the system of distribution, were in every respect inferior to what we had here; and, above all, the price of gas was fifty per cent. higher than our maximum price. The French system of political economy was the worst that could possibly be adopted. It was a system by which the municipality was bribed to participate in the profits on high prices, and the consequence was that those who consumed gas were made to pay a portion of the taxes of those who did not do so. The same thing had been attempted with various degrees of success, and want of success, in this country, a notable example of which existed—and to a certain extent still exists—at Manchester, but under modified circumstances. For many years the corporation of Manchester charged a very much higher price for their gas than the companies in the surrounding towns, and the money so obtained was applied to municipal purposes. The consequence was a certain portion of the community were taxed for the benefit of the other portion. For a time that system went on very well, but it ultimately gave rise to a violent class agitation, which it was always desirable to avoid; one portion of the community was arraigned against the other on the price of gas, and that went on for several years, and at last resulted in the gas consumers beating the non-consumers, and then the price of gas was brought down to something like a reasonable amount. To go into a comparison of the systems in France and England would occupy too much time. All he would say on that point was—Paris was a much better lighted city than London, but the Paris gas in illuminating power was inferior to ours. The fact was, in Paris, the people lived, not as we did, one alongside the other, but one above the other, and the consequence was the population there was distributed over a much shorter length of streets. In Paris they had one lamp to every sixty persons; so that in the principal streets the lights were brought very close to each other; but it did not thence follow that because the city was better lighted, the gas was better. Its inferiority was accounted for by the description of coals they used; they, nevertheless, made as good gas as they could under the circumstances, and they took good care to use the kind of burner which gave the most perfect combustion. This was a matter which was neglected in London, but we were improving in that respect; and when we paid as much attention to these details as was done in Paris, the London gas would give a greater amount than that in Paris.

Dr. Wyld remarked that in the present advanced state of science there might be no practical difficulty in the employment of the subways of cities as channels for the laying of gas and water mains, so as to prevent the constant annoyance arising from breaking up the streets for those purposes. He argued that equally in subways, as in large ramifications of pipes in hotels, &c., the exercise of the olfactory nerves would always sufficiently indicate an escape of gas to a dangerous extent; and in the case of the mains of a gas company, the great thing to be attended to was the proper jointing of the pipes, by which the escape of gas into the subways would be effectually prevented.

Mr. Gore, having had some experience in the laying of gas mains in this country and abroad, was inclined to think that the promoters of the subway system were at the present moment somewhat in the dark on that question. He could quite understand that in situations where there was a sufficient current of air to carry off the escaped gas there could be no explosion; but it did not follow that in a subway the current of air would be so rapid as to have this effect. Having been engaged, in 1861, in laying down gas mains in Valparaiso, the geological formation in some parts was such that at 6 inches below the surface of the soil granite was reached, and through that material a channel had to be chipped away of sufficient depth to admit of the gas main being laid down. Theoretically that would be supposed to form a very beautiful channel in which to lay the pipes, but a reference to the books of the company would show that the cost of repairs in that channel alone amounted to 75 per cent. more than in double the length at other parts of the town where the pipes were laid in a different material. Mr. Hawksley had very properly said that the soil was the best safeguard against the escape of gas, and at the same time it formed the best elastic cushion on which to lay pipes. In laying pipes in a subway, there must be a number of rigid fixed points or brackets on which they must rest, and there would be a severe vibration occasioned by the traffic passing overhead; the effect of which on cast-iron mains so supported would, in a very short period, be very serious, in causing leakage at the joints. He (Mr. Gore) was now engaged in preparations for lighting with gas the city of Mexico, and he had visited every establishment at which he thought he could gain information. Amongst others he had met gentlemen connected with the subways in Paris, and on his mentioning the subject to them, they strongly advised him not to carry the mains through subways.

Mr. W. Macfarlane was not satisfied, upon the evidence adduced by Mr. Burnell, as to the undesirability of the employment of subways for the laying of gas mains, nor did the observations of the last speaker satisfy him more on the same point. He thought if they were not prepared to alter the material of the pipes they must alter the construction of the joints; for if they put pipes in a subway with the present system of jointing, there would be a liability to great escapes of gas. There, was, however, no reason why an improvement should not be made in this respect. The question was whether iron was the proper material for the pipes, unless the interior were coated with a preservative substance; and if, besides this, a better system of joints were introduced, he had no doubt that subways might be used for gas-pipes without danger.

Mr. Burnell, in reply upon the discussion, would simply refer to the observation of Mr. Godwin that the practical objection to the use of subways for gas mains rested on the sole testimony of one French engineer, M. Belgrand. Upon that he would remark that he had referred especially to that gentleman because he was the principal engineer in that department in Paris, and had had the largest practical experience in the laying of gas-pipes in subways. He might mention that M. Belgrand's evidence on that point was confirmed by the opinions of M. Dupuit, who formerly occupied the position of M. Belgrand, by those of MM. Mouton and Huet, engineers of the Ponts-et-Chaussées, and also by M. Leloup, inspecteur des eaux, as well as MM. Gagffier and Camus. The only evidence in Paris anything like favourable to the subways was that of the architect of the Louvre. Therefore, on the one side they had the evidence of engineers who had been practically concerned in the laying of pipes, and on the other side they had only the evidence of an architect. He could only say further, as to the quality of the Paris gas, it was very much below that of London. In the former city the gas was called seven-candle gas, and in the latter the standard of illumination was eleven candles.

The Chairman said they must all feel indebted to Mr. Burnell for his interesting paper. It contained a large number of facts which could not fail to be of service to all who were interested in gas works. He confessed that on the topic which had received the largest amount of attention, he personally entertained some strong views. He was not at all afraid, though he had heard of explosions in the Paris subways, of such occurrences taking place in this country. If that room were closed up and the gas allowed to escape into it, there would be danger of explosion; but if the upper windows were left open, with free ventilation from the bottom of the room, he should have no fear of this. Such a strong current of air might not be agreeable in a house, but it would not be objectionable in a subway. He had been present when gas was lighted in a subway, and when, according to the views of some of his friends, an explosion should have taken place; but there was a sufficient current of air through it to almost blow out the flame of the gas. While that was the case, there could be no fear of explosion from confined gas; and he was surprised to hear gentlemen say that proper attention had not been paid to that matter in the subways already constructed. It was true, as had been observed, that the subways were quite large enough for the entrance of thieves; but he had not yet heard of any depredations upon property through that means, and it would require the removal of a considerable amount of brickwork and other material to effect an entrance to contiguous premises. He was sure all would agree that subways, if safe, must be of great public advantage. They could not fail to be a great benefit to the gas companies. He did not expect any great change to be effected without considerable opposition and discussion; but good resulted from this, for thus attention was drawn to any weak points, and those who had to conduct the improvements were led to avoid dangers that might otherwise arise. While so many advantages were held out he was persuaded that nothing would prevent an improvement from going on. Since this subject was first mooted he had seen great changes in public opinion, and in the minds of gas engineers themselves; and many who were opposed to subways—even amongst the engineers in Paris—were now looking forward to a better state of things, and even made propositions for introducing gas-pipes into the subways. He hoped a further discussion would take place on this subject, and that some of his friends would be led to modify their views. He was sure they would feel that a cordial vote

of thanks was due to Mr. Burnell for his valuable paper.

A vote of thanks was then passed and acknowledged.

RAMBLING IN DUBLIN.

Immediately beside Werburgh is Hoey's-court, famous as the birth-place of Dean Swift. The house is one of a few very old brick buildings, in no way remarkable in appearance, yet No. 9, Hoey's-court, has been looked at, scanned, sketched, and re-visited by travellers and strangers from all nations. Passing on through Bride-street and Patrick's-close we reach St. Patrick's Cathedral, the scene of Swift's labours. Externally, it is an imposing spectacle. Its massive granite steeple, and the lofty tower from which it springs, its pinnacles and flying buttresses, its windows and its deeply recessed doors and their hooded mouldings and corbel heads, all combined, render it an object for study. In the interior are Swift's tablet and bust, the tablet erected to the memory of his man-servant, that of his unfortunate love, "Stella;" and those of Curran and Ogle. The old Earl of Cork's monument, with its curious group of coloured entities, is somewhat fantastic; though unartistic, it is unique and old-fashioned in its way. Captain Boyd's statue, by Farrell, is a good piece of sculpture. The commander of the *Ajax* is here represented in a position, and in conjunction with everything that was necessary to personate the man and perpetuate his memory—size, expression, attitude, in all boldness; and in every minutia attendant, correctness: Farrell has added to his fame in perpetuating that of his subject.

Outside and around, save the Cathedral itself, there is nothing to please, but much to pain and aggravate.

The locality and its offshoots and alleys are filthily dirty and dilapidated. Surely St. Patrick's is like the jewel in the toad's head. Could it be transplanted elsewhere, or could elsewhere be made to surround it, it would indeed be a boon.

Nicholas-street, Patrick-street, Bull-alley, which ought to be called Butchers'-alley, and the several narrow lanes here and about, need cleansing. Dirt, dirt, dirt; animal and vegetable refuse, disfigure the thoroughfare. Until a new street is made from Aungier-street, straight, say, with York-street, communicating directly with Stephen's-green, Patrick's Cathedral and its improvements will be buried and destroyed by the retrograde property that surrounds it.

A few minutes' walk brings me into the Coombe, in that locality known as the "Liberties." This is the old city where once Irish trade and manufactures flourished. Ten thousand looms, whose shuttles danced with weft and web, whirled and smacked the year round here, time ago. Silk and satin, poplin and tabinet, frieze and corduroys, were woven, and imported in bales from the Thames to the Tiber; but the echoes of the Dublin "Liberties" now speak not of the loom or the spinning-wheel. The sepulchral voices that come forth from this living Golgotha of the buried alive, amid the tiles and pavements of those forlorn lanes and alleys, are utterings of exhausted nature, the final efforts of crucified souls in the mortal throes of misery and desolation. I walk up and down those sweltering passages, and listen to the details of indigent industry here crushed by distress; I grope out the truth, and would flash it manfully in the face of the world, that truth may out and one part of the kingdom know how the other part lives.

There is little trade now, indeed, in these "Liberties," or has been for several years. The staple trade of this quarter of Dublin declined after the Act of Union. The sanitary condition of the Coombe and Liberties, common report says, was always bad, and personal observation confirms it in many particulars. I have not heard of such an officer as an inspector of nuisances, nor do I remember ever coming in contact with an officer of health, but I have met one or two functionaries termed relieving officers; though their duties appeared to me to consist more in collecting than distributing.

The scavenging work of the corporation being done by contract, the Liberties are paid small attention to, their streets and lanes are but half swept, and sometimes not at all; but the city in general being a healthy one, a tainted or neglected locality of course weighs small against the whole. I have refrained from particularising in the above exact spots by name, for the simple reason that the large district known as the Coombe and Liberties embraces many spots alike, and altogether the district is in a bad condition.

Returning through Frances-street, which is an old and busy thoroughfare, Thomas-street is entered, the main thoroughfare of the southern side.

A new Roman Catholic church is here erecting, by the Augustinian order. The door and windows are of red or Runcorn stone; the mouldings are well cut, the members closely fitted, and the work, as far as it has gone, is well done; but the introduction of this stone, I fancy, will not prove advantageous in the end, however useful or easily worked it may be for ornamental purposes or in saving working expenses in the beginning. The church is built on the site of an old priory of the order, which dates back several centuries, and which had extensive ramifications. On farther to the left is Catherine's Church, an old building, plain, and the least classical in the exterior. It has a clock-tower. In the street opposite the church was the spot where Robert Emmet was hanged, in 1803, as the leader of the insurrection of that year. Emmet was the betrothed of Sarah Curran, the daughter of John Phillpot Curran, and he is the subject of Moore's lines, "Breathe not his Name;" while his beloved was the "Broken Heart," of Washington Irving's story.

James-street is next entered,—a good business street,—off which is the Four Courts Marshalsea, or Debtors' Prison, lately the abode of some Irish editors and female lawyers; Mrs. Catherine Winter, to wit, with her interminable suit of "Stubber *v.* Stubber." Dickens's Miss Flit, in Chancery, who used to come and go when she liked at Lincoln's Inn, was not a greater bore, poor thing, than was Mrs. Catherine to Chief Justice Monahan, whom she teazed, tormented, and thumbscrewed.

Golden Bridge Cemetery is behind the barracks, and belongs to the directors of Glasneven Cemetery. It was the Roman Catholic burying-place previous to the opening of Prospect; but the havoc made by the ravages of the first cholera, in 1831-32, so packed the burial-ground as to necessitate its closing up. Latterly, graves are opened for others than those whose relatives are interred there. This system is most unjust, for the ground that is now opened for strangers has been already paid for, perhaps thrice over, by parties who never registered the graves: but what boots it, they were poor and plague-stricken?—

> "Rattle his bones over the stones,
> He's only a pauper whom nobody owns."

Inchicore works are next reached, belonging to the engineering and fitting department of the Great Southern and Western Railway. Turning my back to the country, I proceed home by a parallel road at some distance. There is a thriving co-operative store, conducted on the English principle, at Inchicore, doing seemingly well. The new Kilmarnham Gaol is massive and gloomy, like all its kind. Re-crossing the Circular-road, I enter the grounds of the Royal Hospital, the Irish Chelsea. The main building is surmounted by a sort of clock steeple; a somewhat conspicuous object, from its height and form.

The edifice underneath is elegant and lofty in its interior, and the open roof is a good specimen of oak framing. Some fine carvings by Grinling Gibbons are pointed out. These grounds were said to belong to the Knights Templars originally. Of the truth I know not. Beside the ground of the Royal Hospital is the antique burial-place popularly known as "Bully's Acre." A stone is pointed out where an Irish monarch is supposed to rest. Donnely, the noted Hibernian pugilist, is sleeping his last here. Bully's Acre is held by many to be the place where Robert Emmet was buried by stealth. This place has been closed up for years.

For a public park, the Phœnix is one of the most extensive in Europe. In circuit it is several miles. It is mostly under green sward, interspersed with trees. Here and there plantations, shrubberies, and copses are railed in. There is a level plateau known as "The Fifteen Acres," where reviews were for a number of years held in honour of the anniversary of Waterloo. The Phœnix is intersected by some roads which lead through the country. The residence of the Viceroy, known as the "Viceregal Lodge," is situated in the park, as every one knows.

"Where is St. Michan's Church, my boy?" "Turn down to your right, sir, and go down straight, and it is near the bottom of the street." I was not long in reaching it. I had not an opportunity on this occasion of viewing its celebrated vaults, which possess the property of preserving its dead for years intact in flesh and feature. But common report tells as much. The ground of St. Michan's is not the only ground possessing this preservative quality. It is ascribed to the nature of the soil. St. Michan's has Irish political memories. The bodies of the headless brothers Sheares, who were executed in 1798, are said to be in these vaults. The often-disputed question of Robert Emmet's burial-place receives matter from an uninscribed tomb in the churchyard here; but whether it is that of the noble but unfortunate leader of the Irish insurrection or not, Irish writers are not agreed. "Where is Emmet really buried?" has elicited nearly as much discussion as "Who was Junius?"

And here we are, reader, again at the back of the Irish Four Courts; but before we enter let us have a peep across Church-street Bridge. Yonder compo-fronted structure was whilom Homes's hotel, of Queen Anne farthing memory. The lucky George, who stumbled across this unlucky wealth, began to speculate in building. The Royal Arcade, which extended from College-green to Suffolk-street, and which was a little promenade of fancy shops, sprang forth under his magic wand, but was soon afterwards burned down. The hotel did not long subserve the original desire. It has passed through a variety of vicissitudes,—political, polemical, and commercial.

The Great Agitator threatened and cajoled here; and Conservative as well as Democratic tribunes have mounted the rostrum in advocacy of their own nostrum for Ireland's salvation.

Here for awhile, a quarter of a century since, the Irish hemisphere was convulsed with the spectral appearance of the White Quakers, a unique religion, led by one Joshua Jacob, and his wife Abigail, Beale. I remember in my juvenile days seeing some of the fraternity in the streets, all in white, with the exception of the shoes, which were made of a description of brown leather. Homes's Hotel was the head-centre and rendezvous of this curious sect, who rivalled Adam and Eve, by going about within doors in a state of innocent nudity, with the exception of some slight vagaries. They afterwards became an excellent and industrious body, cultivated some ground in the village of Chapelizod, near Dublin; but they eventually died out. Homes's building is now transformed into a wool-store and something else.

The old Pill-lane has nearly disappeared, in making a thoroughfare at the back of the Courts of Law. It was a remarkable locality once, rife with trade, and a very Billingsgate of impudence, as it is still in its upper and remaining end. Irish fishwives are politicians after a fashion, and have the "gift of the gab." O'Connell often threatened them with the authorities.

Here and around for a considerable extent, embracing Greek-street, Church-street, Mary's-lane, Fisher's-lane, Boot-lane, Beresford-street, and its contiguous opens, the state of those localities is very bad. Filthy pavements, offensively stinking back yards, tenements in a ruinous condition, with dirt, dirt, jaggedness and raggedness, and wretchedness predominant. The corporation seem to forget that there are such places as I have mentioned; consequently, the atmosphere and the elements, the wind, the rain, and the sun in turn become the purifiers and the destroyers.

The vegetable markets in Mary's-lane and May-lane are wholly unfitted for the purpose. They are too small, and are unprovided with the proper requisites of that trade. The approaches are too narrow and confined.

The removal of that part of Pill-lane behind the Law Courts was a step in the right direction. There is much work for an energetic corporation who would become less parliamentary and more municipal in their duties.

A peep into the hall of the Four Courts in term time presents a busy scene and a motley assemblage. Lavater and his disciples could not pick out a better place for the proper study of mankind—Man—than the hall of the Irish Law Courts. Pregnant packets and briefless bags,—the florid looking, the phlegmatic, the languid, the sallow, the immoveable, the fidgety, loquacity, taciturnity, eccentricity,—all combined, find embodiment, and present themselves for study in the hall of the Irish Four Courts.

The public squares of Dublin add to the beauty of the city, and are of course a great acquisition in a sanitary point of view; Mountjoy and Rutland on the north side, and Merrion

and Fitzwilliam squares on the south. But these squares are open to much improvement in their condition and management. They exist alone for the benefit of the wealthy and the *élite* of the surrounding neighbourhood. Their interests should be bought up by the corporate authorities, and all of them should be free to the working population, who have been found latterly, when given like privileges, to be more conservative in guarding such property than the nurses and the children of the respectable families that have daily entered.

The new buildings on the site of the Dublin Exhibition building of 1853 are, as far as good masonry is concerned, undeniable. But the National Gallery and its companion Institute, externally, are bare and meagre skeletons of classic taste. There is nothing impressive or elevating in these buildings, although they were evidently intended, from their nature, when first designed, to represent in their fulness what they do not.

On Stephen's Green South, the Catholic University occupies the fine old granite-fronted mansion, once the residence of the celebrated "Buck Whalley," in the last century, called otherwise "Jerusalem Whalley," from the fact of his once making a wager that he would play ball against the walls of Jerusalem and return to Dublin within the year, a feat which he accomplished (not easy in those times) considerably within the time. In a straight line with this side of the green, you are led out through Leeson-street to the world-known village of Donnybrook, the *locale* of the famous fair, of which the song says,—

> "An Irishman all in his glory was there,
> With his sprig of shillelagh and shamrock so green."

The Donnybrook road is a rapidly-improving quarter, since the recurrence of the fair has all but disappeared. The Winter Garden, lately the busy scene of the Exhibition, is a few minutes' walk from the green, having its entry in Earlsforth-terrace. It is built on the site of the old Coburgh Gardens, — a spot noted for public meetings once: the last and most noted, which was held at the instance of O'Connell, was suppressed by the order of Lord Anglesea, when viceroy of Ireland.

Dublin, on the whole, is a healthy city, and is not unfavourably situated; but there are districts on its northern and southern extremities sorely neglected by its corporate authorities. Improvements drag their slow length along, and projects are proposed and agreed to, but are years before they make their appearance.

The city needs many new streets, to pierce through reeking purlieus and to carry the fresh invigorating winds of heaven into quarters where unbearable exhalations and fetid odours hold sway. Like the Thames, the Liffey needs to be purified, or kept from being offensive in the summer. In an embanked river like the latter the difficulty is small. If the corporation have the will, they have plenty of means; and the way to do it has more than once been pointed out. Plans for rendering the Liffey navigable for some miles were also shown years ago, but no steps were taken in the matter.

Capital and labour will yet work miracles in favour of Irish trade and commerce; and if that great fear was got rid of concerning security which has taken possession of several speculative minds, the city and country at large would grow and prosper. House-building for some years in the metropolis has moved apace, and ship-building has begun lately to develop itself, after the eclipse of half a century. With the reclamation of the waste lands, the opening up of the industrial resources, and the utilization of the mineral capacities of the country, Dublin would become a great manufacturing capital, and she is fitted in every way to become one.

C. H. C.

FROM LAUNCESTON, TASMANIA.

THE Town-hall, which is newly erected, stands on an allotment of land at the junction of St. John and Cameron streets, specially granted by the Government to the municipal council for that purpose. It is a prominent object in the street architecture of the northern capital of Tasmania. The elevation is an adaptation of the Corinthian order of architecture, and has a frontage to St. John-street of 76 ft., and to Cameron-street of 52 ft. The principal front is towards St. John-street, the centre forming a grand piazza, approached from the street by a flight of steps the whole length of the colonnade, and forming the entrance to the municipal offices. Connected by this piazza are two wings, in which are placed the staircases approaching the large council-chamber or town-hall. The roof and cornice of the piazza are supported on four Corinthian columns and pedestals, each the entire height of the building, and the remainder of the rear messengers' apartments. The whole area of the upper floor forms the council-chamber or town-hall, 72 ft. by 40 ft. and 20 ft. high, lighted chiefly from the roof by lofty dome lights, surmounting the three centre compartments of a panelled ceiling. There is also a window at the southern end. The building, which is of brick, stuccoed on the outside with cement, is surrounded by an ornamental iron railing, which was cast at the foundry of Mr. W. Peter, Launceston. The cost of the building and furniture therein exceeds 6,000*l*. Mr. Peter Mills was the architect, and Messrs. S. Galvin & Francis the contractors.

A SELF-LOADING SHIP.

M. DE CORAUX, a Lyonnese, has invented and constructed a ship which can load or unload itself automatically in forty minutes. The captain and mechanician are the only living crew on board, the working and manipulation of the vessel and cargo being all performed by steam applied to most ingenious machinery. The loading is carried on by trucks and wagons, which can contain corn, flour, bales, cattle, horses, barrels, &c. The vessel is, as may be expected, of a peculiar disposition; but its exterior bears all the signs of sea-worthiness. The great revolution is on the deck and in the interior. The former is covered with lines of rail, reaching from one extremity to the other, while, at midships, there are two turntables. Front and rear are two or four immense cages, containing eight, twelve, or sixteen wagons, of the same size as our railway-wagons. The rails on which the wagons rest are adapted exactly to the rails of the deck. A cable is hooked to the wagons, which traverse the deck throughout its length, and the stern of the boat having been previously placed on a level with the quay, which is also furnished with rails, or may be, perhaps, a portion of a terminus, the wagons glide without the least interruption from the vessel to the land, and *vice versâ*.

BOMBAY EXHIBITION.

A MODEL by Mr. Salter, the well-known modeller, has been on private view at his residence, which we could wish to have been more publicly displayed.

The model in question has been prepared from the design of Mr. T. Roger Smith, for an International Exhibition hall, at Bombay. We hear that the plans were completed, and the building actually contracted for, so far back as April, 1865, when the panic at Bombay arose. This stopped the works when barely commenced, and it is still undecided whether the building will be erected or not. In the mean time the design is of great interest to those engaged in architectural or engineering business for India, or any hot country. The idea suggested by the model is that of deep and grateful shade. Roof rises above roof almost more as a growth than as an edifice, and the peculiar requisites of the climate of Bombay, involving protection from heat, resistance to the fury of the monsoons, and provision for the tropical rainfall, have been attended to in a manner which the different circumstances under which Exhibition buildings have been erected in Europe have not hitherto called forth. It is to be regretted that the model, being required for India, must be despatched without waiting for further exhibition in this country.

RAILWAYS BEYOND JOHN O'GROAT'S HOUSE.—A Scottish nobleman, who is connected by property with the Orkney Isles, has offered, it is said, to subscribe 60,000*l*. for the construction of railways in Orkney,—on Pomona, the chief isle, on which Kirkwall, the capital, stands, we presume; unless, indeed, it be intended to connect some of the lesser isles which most closely adjoin each other, by railway, which is not so likely.

CHAPEL ROYAL, SAVOY, STRAND.

THE Chapel Royal of the Savoy derives its name from the ancient palace built for Peter, Count of Savoy, and uncle of Queen Eleanor, in the middle of the thirteenth century. At that time, according to Stowe, "There was no mansion to bee compared with it in beautie and statelinesse."

The greater part of that palace was laid in ruins during its occupation by John of Gaunt, in the rebellion of Wat Tyler. The manor descended to John's son, Henry of Bolingbroke, on whose accession to the throne as Henry IV. it was vested in the Crown as part of the Duchy of Lancaster, and acquired its peculiar dignity and privilege as a royal precinct. Upon the accession of Henry VII., the Palace was endowed and appropriated for the uses of a hospital, and the walls of the present chapel were built.

Charles II. converted the hospital into a military and marine infirmary, and the chapel did duty as a place for holding barrack services.

In 1702, the hospital was dissolved and in part destroyed. The chapel was granted for the use of the inhabitants of the precinct; the Sovereign retaining all rights of patronage and direction in the affairs of the chapel, and defraying all expenses connected with it.

Under this rule the chapel has, from time to time, been restored; the most considerable changes finding place in the year 1860, under the advice of Sir George Grey, then her Majesty's Chancellor of the Duchy of Lancaster. A hideous gallery at the south end was removed; high pews exchanged for open seats; an entrance at the north end, treading almost upon the steps of the altar, closed up and transferred to the south end.

The ceiling, nearly resembling the contemporary one of the sister chapel in St. James's Palace, was redecorated, and the curious and carved ornaments of its 138 quatrefoil panels recoloured and regilded.

The gains of this costly restoration were utterly lost in the fire which consumed all but the walls of the chapel, in July, 1864. The work of the present restoration was entrusted to Mr. Sydney Smirke, R.A. (who, it is needless to say, has done his duty well), and was executed by Messrs. Myers & Son. The interior arrangements of the chapel are only slightly altered; an elongation of the chancel and a new entrance into the sacristy being the chief changes. The old and richly-emblazoned ceiling has been exchanged for one exactly similar in style and colour, but differing in the details of its design.

An elaborate framing of chestnut wood, with gilt mouldings, encloses a ground of blue,—semée with gold stars,—and of white, the ancient livery colours of the house of Lancaster.

The panels over the altar and chancel are occupied by sacred devices. The panels towards the south are filled in with the heraldic bearings of the Earls and Dukes of Lancaster, from Henry III. to Queen Victoria.

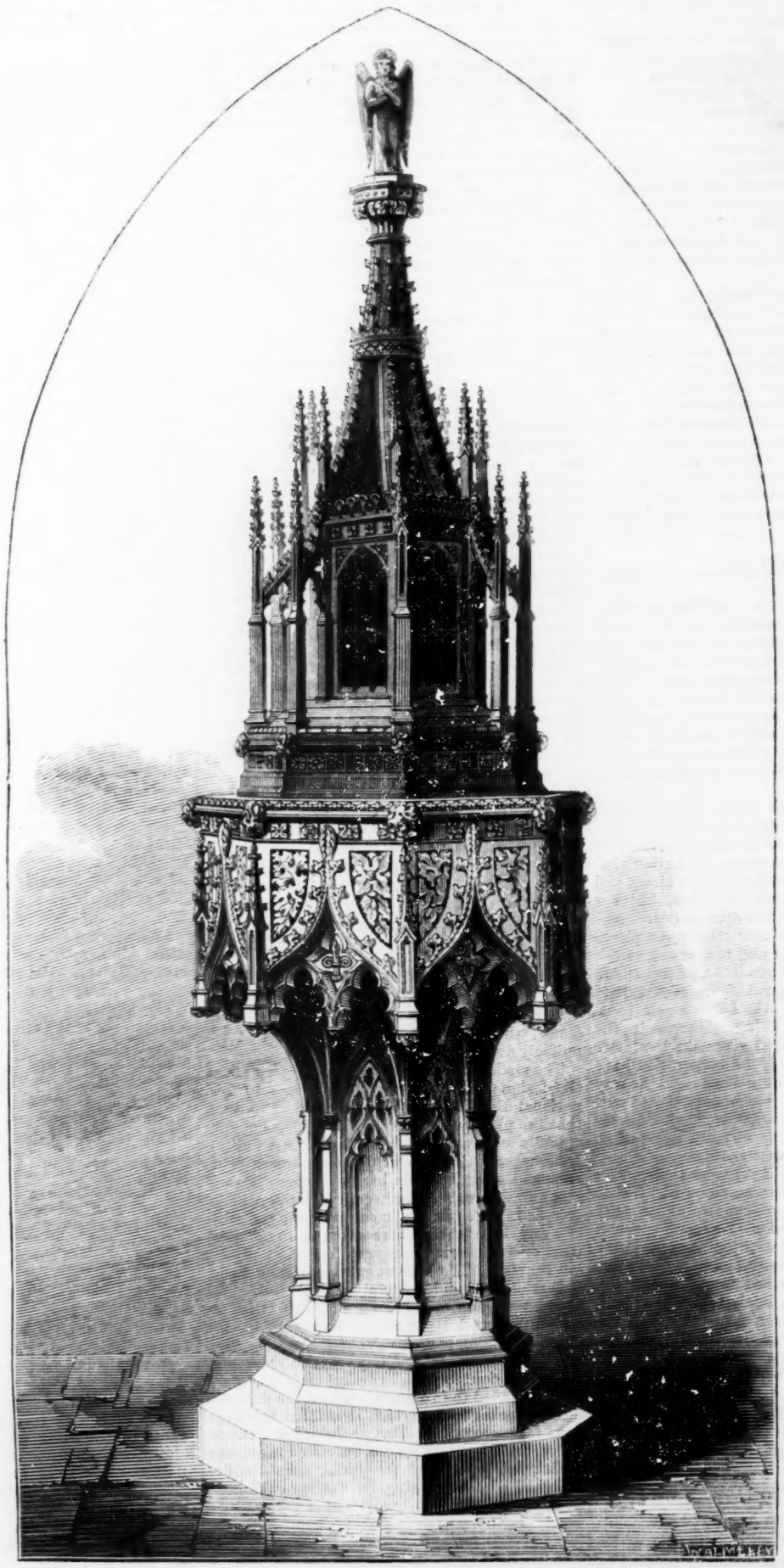
The painted glass window is erected in part as a restoration of a former one, and in part as a memorial of the late Prince Consort. It contains five principal figures,— St. Mary the Virgin, St. Mary Magdalene, St. John the Baptist, and St. John the Evangelist. The central opening has a figure of our Lord. The following inscription surrounds it:—

> "Hanc fenestram ex dono in colarum hujus Precincti vitreis ornatam, A.D. MDCCCXLIII, igne cum ipso sacello dirutam, A.D. MDCCCLXIV. In memoriam Principis Consortis de novo ornari Victoria Regina MDCCCLXVI."

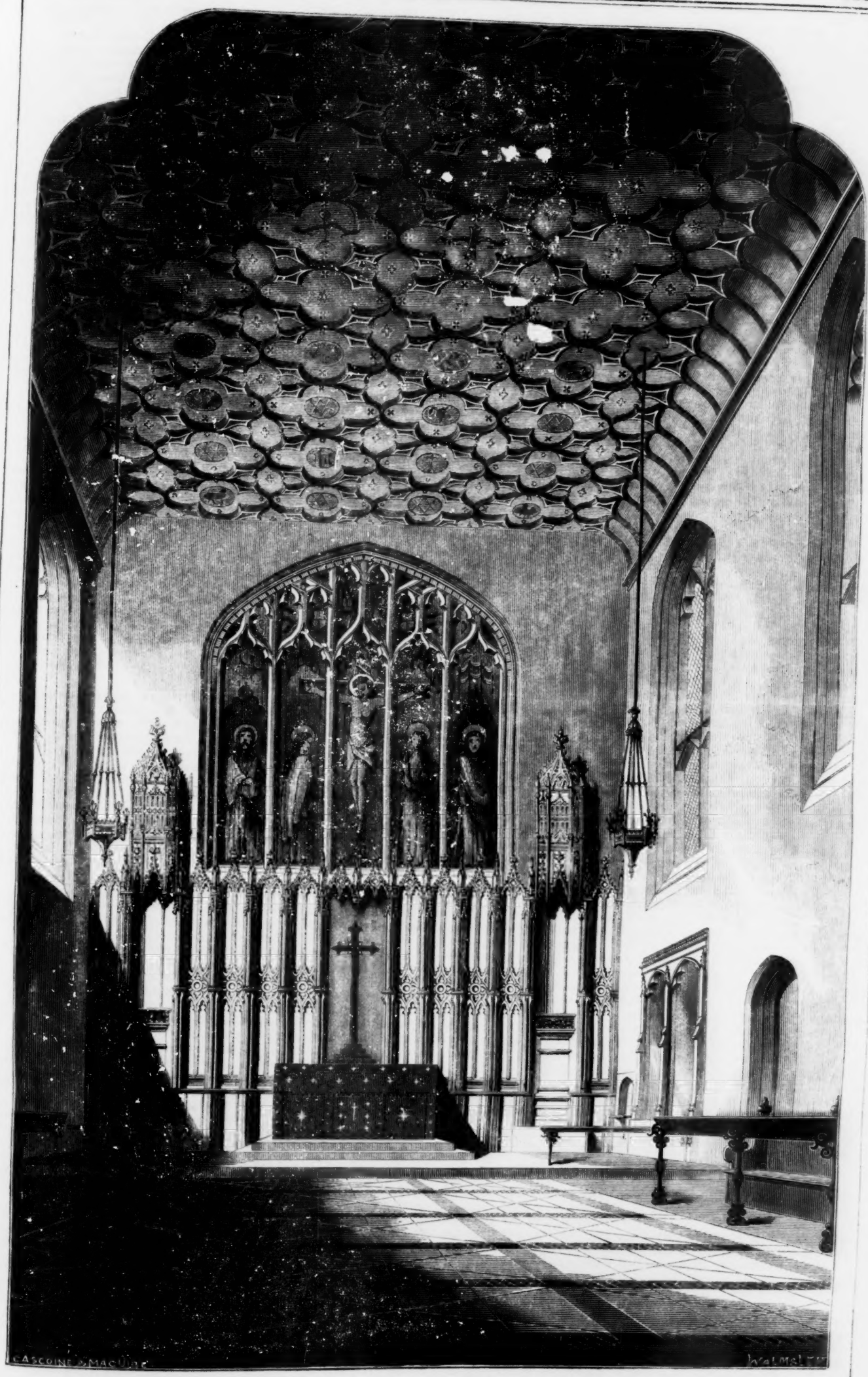
The ceiling and window were executed by Mr. Thomas Willement, F.S.A. The font was presented to the chapel by Mrs. De Wint, in memory of her husband, Peter De Wint, and her brother, W. Hilton, R.A. The font and its canopy are from a design by Mr. Edward Blore, and are beautifully executed by Mr. James Forsyth, of Edward-street, Hampstead-road. The font is of Caen stone, and the canopy is carved in wainscot oak. The pulpit, supplied by Messrs. Cox & Son, is a gift to the chapel, from the family of Mr. Burgess. The reredos is a faithful and excellent copy of the former one, and has been well executed by Messrs. White, of the Vauxhall-road.

The organ, replacing one presented by her Majesty, in 1843, excels its predecessor, both in point of size, and beauty of tone. It is built by Willis.

We must not omit in our notice, brief as it is, allusion to the zealous regard for the church shown by the present chaplain, the Rev. Henry White.



THE SAVOY CHAPEL, STRAND.—*Font and Cover.*



THE CHAPEL ROYAL, SAVOY, STRAND: AS RESTORED.—MR. SYDNEY SMIRKE, R.A., ARCHITECT.

PROPOSED NEW THEATRE, LEEDS.

A SITE and plans for a new theatre in Leeds, have been obtained. The ground chosen as the site for the new theatre is in Park-place. The plans have been prepared by Messrs. Moore & Sons, of Sunderland, and Mr. Backhouse, of Leeds. The auditorium adopted is circular, gradually curving outwards to the proscenium to a width on the box tier of 44 ft., and on that of the gallery tier of 48 ft., with a depth from the stage to the back of the pit, of 52 ft. The dress circle will be projected some small distance into the body of the house beyond the gallery curve, so as to assume, with its canopy, the appearance of a balcony.

The respective accommodation accorded to visitors will be as follows:—Private boxes, 84; family ditto, 40; dress circle, 90; pit, 1,000; gallery, 1,300; total, 2,514 persons. The gallery will have backs to the seats: the pit seats will have backs also.

It is not proposed to devote the building exclusely to the drama, in fact, it is to be constructed expressly so that, when necessary, it may be used either for grand concerts, oratorios, or public meetings.

VENTILATION OF CEILINGS.

THE *Builder* of December 23rd last, p. 911, contained a communication from Dr. D. O. Edwards upon a project for the adit of smoke from buildings by means of a *horizontal vomitorium*, in lieu of the ordinary perpendicular chimney-shafts. The practical objections to this scheme were very summarily stated in the concluding editorial remark; but an idea occurred to me in reading the letter, which I have since been able to work out so satisfactorily as to be justified in offering a suggestion, which I cannot but think may prove exceedingly useful.

The portion of Dr. Edwards's scheme which may be turned to valuable account consists in the tube with apertures at each end, into which his intention would be to lead the various smoke-flues.

Without discussing the practicability of contriving such an apparatus as he proposes, and of overcoming the probably insurmountable difficulties of soot, and interference of one chimney with another, I can point out in what manner, and for what other almost equally important object the idea can be used.

The simple ventilation of ceilings is an important matter, and so far as I have seen no scheme could be so effective and so easily applied as the provision of a zinc tube between the floor timbers, opening by a large funnel-shaped aperture (ornamentally treated as to its perforated face as you like) in the centre of the ceiling, and discharging into the open air. Thousands of such tubes have possibly been applied, but the difficulty has generally been to secure the adit of heated air, and prevent the down-draught caused by the inward rush of the cold external atmosphere. Various contrivances may be seen to attempt to effect this,—some by connecting the tube with a flue at side of the chimney, a costly and not always practicable mode; and others by wind-guards, patent caps, and the like, attached to a perpendicular pipe more or less high, into which the horizontal hot-air duct is made to open. Few of these work well, and they are unsightly and otherwise objectionable.

A case in my own professional experience having recently occurred, I have thought it worth while to state the simple mode I have used, which works so satisfactorily under circumstances almost exceptionally difficult, that I feel a principle may almost be said to be established thereby.

The particular instance is of a room, small and low-pitched, in which gas is burning many hours in the evening, and in which the ordinary channels of ventilation by doors and windows are so situated as to render recourse to them generally impossible. In this case an aperture 12 in. diameter has been made in the ceiling immediately over the gas-burner, and in this aperture is placed an ordinary metal basin inverted, with its opening level with the ceiling, and covered with a perforated metal disc. The bottom of the basin has been cut out to receive a zinc tube 4 in. diameter, flattened to a little more than an inch in depth, on account of the necessity to cross and cut into each rafter instead of lying between them. This tube is carried out into the open air through the external wall, and projects about an inch into a wooden tube or box, 3 ft. long and about 6 in. square, placed horizontally, and fastened against the wall. Each end of this box is open, but is filled with very fine wire-gauze.

As soon as this tube was fitted to its place, a perceptible upward current of the air within the room was noticed against the perforated opening in the ceiling, and the same continues steadily and unvaryingly to exist. Its escape is as palpable during the day as in the evening when the gas has been lighted, and the atmosphere of the room is sufficiently and most agreeably relieved. Before trying this, other contrivances had been placed at the end of the hot-air tube; but try what the owner would, the in-rush of cold air was too great for the feeble efforts of the escaping hot air to repel. I find that the effect greatly depends upon the fineness of the gauze, which in this case has been formed out of an ordinary wire-blind.

The situation of discharge had, in this particular instance, much against it, being surrounded by buildings, and exposed to very strong eddies and draughts of wind.

The ordinary air-bricks which are inserted in walls for the admission of cold air might be contrived to lead into openings in the ceiling, and by having externally a case contrived upon the principle of the one I have described, provision could be made for escape of heated air. Professional brethren may, moreover, see how easily this method is applicable as an architectural feature upon a building, either in the form of a string-course or band in one continuous length, with perforated ends, or by being broken into sections, and treated ornamentally, as individual feeling may suggest. I can only state that the applied result has been so satisfactory and uniform in this particular instance, that I think the principle well worth more extended trial. The *rationale* of action is easily intelligible, and is well explained in the communication of Dr. Edwards, from which this hint has been taken.

GERVASE WHEELER.

SUBWAYS AND OTHER IMPROVEMENTS, NOTTINGHAM.

THE town council of this borough have, during the last six or seven years, constructed two subways under the new streets which have lately been formed in the very heart of the town, and a few days ago almost unanimously instructed Mr. Tarbotton, the corporation surveyor, to build another subway under a new street in the centre of the town, which is now in progress. These subways are similar in principle to the Garrick-street subway in Covent Garden, of which we gave illustrations, but vary in detail. Hitherto, as we understand, these have been highly successful; but in consequence of the support Mr. Tarbotton rendered the Metropolitan Board of Works on the occasion of their application to Parliament on this question two years ago, the gas and water company, we are told, have refused to use the subway last made here. The corporation are highly indignant, and intend to pursue the system, nevertheless, in all their new streets. A large amount of work has been done in Nottingham, in street improvements, at a very large cost; also in sewerage.

SANITARY MATTERS.

Sheffield.—In a court in Thomas-street, containing twelve houses, according to the local *Independent*, there have been nine deaths from fever since the early part of November. In all, more than twenty persons have been attacked in the yard, seven having been prostrated in one house alone. The only house that has escaped the contagion, remarks our authority, is one with windows to the front as well as back, and therefore capable of through ventilation; and the escape seems to be due to the judicious care of the mother, who has not only kept the house well ventilated, but taken the precaution to change her dress before going among her children, after visiting and assisting her fever-stricken neighbours. There have been other cases of fever in the neighbourhood.

Liverpool.—At the usual weekly meeting of the health committee, the medical officer of health reported that the number of deaths registered in the borough of Liverpool during the week ending February 3rd, 1866, was 378, or 237 in the parish, and 141 in the out-townships, being an increase of forty on the corrected averages of the last ten years. In reply to a question put by the chairman, Dr. Trench said one thing was evident, that the slightest fall in the thermometer meant a high death-rate. In reference to diarrhœa and all those diseases which depended on the ferment of decomposing matter, it was perfectly convincing that the want of rain increased the death-rate in those diseases, so much so that in the last annual report he had given the rating of the barometer day by day according to the daily deaths by diarrhœa. The evils resulting from the sewage would be magnified in hot weather and dry weather, for the compressed gases rose and fell with the barometer. The chairman remarked that those facts should be brought before the sub-committee on the health of the town.

Manchester.—Amongst the notes of the Registrar-General in his last quarterly return, is a report on the sanitary condition of Manchester by a local registrar in the Deansgate sub-district, in which the reporter says:—"The unhealthiness of Manchester is due to its vitiated atmosphere. We have had an unusually dry season, and an extraordinary amount of sickness, with excessive mortality. Nothing but the constant rain we have in ordinary years makes a residence within its bounds tolerable. The air is well washed often, and we survive. . . . . We have fever amongst us, and cholera at our doors. We know how fatally these are promoted and extended by the evils which we see and recognise, and yet fear to touch. Unhappily, the value of human life is outweighed by other considerations. The evils of a polluted city atmosphere exist in concentrated force in the courts, alleys, and confined overcrowded rooms in which so many of our labouring population live; and these are more difficult to deal with. The air is stagnant, and, as the courts and alleys are closed at one end (blind alleys), there is no possibility of ventilation, unless artificial openings are made. But a foul atmosphere is not disagreeable to a large class of working people, who enter it with indifference; and it is almost impossible to get them to open their windows. Though they are amply supplied with water, extreme uncleanliness of person, dress, and home, is also matter for much regret. For this, no remedy exists but education; and the clergy of all denominations hold a power which they might exercise most beneficially in the inculcation of sanitary lessons. At the present time benevolence can hardly find a nobler field. Dirt and squalor are the enemies of religion as much as of health."

Sunderland.—The sanitary chairman of this town, it may be recollected, stated in reply to observations in our pages, that there was not a pig in the entire town. What, then, does a recent recommendation of the sanitary committee itself mean,—"that Mr. Humphrey be authorised to take all necessary proceedings to have pigstyes in Cage Hill, Monkwearmouth, removed, or the nuisance caused by them abated?" If there be no pigs there can be no pigsties—except perhaps human ones, of which there are a superabundance, according to their own medical officer, Dr. Evans (who, by the way, confirms the truth of other statements in the *Builder*). In a recent memorial, he says,—"I regret to have to report to you that fever has greatly increased in the district during the last eight or ten days. It has hitherto been extremely localised, but it is now more diffused, and I doubt not, under present circumstances, will yet spread to spots where it may not be wanted. It would be an insult to inform educated gentlemen that nothing exists without a cause, and that the causes of typhus are more or less, if not entirely, removable. If you ask me their nature, I have simply to direct your attention to the horrible stench that has been given off during the last fortnight (especially in the evenings) by the outlets of your deep drainage. If you ask the misinformed people themselves what they suppose to be the cause of their misfortunes, they will give you, one and all, the same reply,—'It's the smell behind the door.' I will content myself with summarising what I believe to be the causes of a visitation that has now been with us eighteen or twenty months, and which I am sorry to say gives us no encouragement to hope for its immediate extinction. I here arrange these causes in the order of their importance, according to my own views and experience. 1st, overcrowding; 2nd, water-closets without water; 3rd, gully-holes in house

passages; 4th, slaughter-houses with putrid offal; 5th, poisonous gases from outer drains; 6th, defects in construction of dwellings; 7th midden steads. The causes of these modern plagues,—typhus and cholera,—are the same in their essential nature as the causes of the plagues of old, dirty persons, dirty dwellings, impure air, impure water, errors of drainage, overcrowding of houses and narrowing of lanes, with accumulation of filth, whether it be on the surface of your streets or behind the doors of slaughter-houses. The public health imperatively demands that supervision should be placed in experienced and enlightened if not in professional hands; for in this important matter technical skill and scientific knowledge are more or less essential, together with a large share of humanity and freedom from prejudices."

HOUSES FOR THE WORKING CLASSES.

At a time when 16,000 houses, threatened by new railway Bills affecting the metropolis, may be doomed to follow thousands already demolished, it is gratifying to observe that the subject is exciting an increased interest, and that there is now a prospect of something worth speaking of being done towards the replacement of so many of the people's homes.

A Bill has been brought into Parliament to enable the Public Works Loan Commissioners to make advances towards the erection of dwellings for the labouring classes in populous places, and various meetings are being held, and proceedings taken, with the view of advancing the same important purpose of providing the working classes with improved substitutes for the dwellings of which they are being deprived.

Mr. Peabody, in the letter wherein he announced the noble gift of 100,000*l.*, in addition to the 150,000*l.* previously given, expresses his entire approval of what his trustees have done.

"Taking the joint capital of the two gifts, he remarks, at a minimum of 250,000*l.*, it will form a fund, the operation of which is intended to be progressive in its usefulness as applied to the relief of the poor of London (so correctly defined in your recent report), without exclusion in consequence of religious belief or political bias. It will, therefore, act more powerfully in future generations than in the present, and it is intended to endure for ever . . . .

It is my desire that my trustees for the time being may seek out and secure at such rates as the state of the fund may warrant, such freehold sites, within ten miles of the present Royal Exchange, as may appear eligible, both on account of salubrity of position and proximity to the great centres of labour and railroad accommodation, due regard being had to the probable burden of taxation . . . .

The trustees shall be at liberty, should they consider it needful, to set apart space adjacent to the building and suitable for school-houses for the children of the families holding tenements. But such schools must be so organised as carefully to exclude sectarian influences . . . .

As some of these dwellings will probably be at inconvenient distances from good markets, I would also suggest to my trustees to consider the propriety, in localities where it may seem to be required, of providing within the buildings, or near to them, apartments in which the tenants may organise co-operative stores for supplying themselves with coal and other necessary articles for their own consumption, subject to such regulations as, in the judgment of my trustees, may be needful . . . .

I entertain a strong and earnest hope that the project will so commend itself to the sympathies and judgment of the inhabitants of London, as to insure on their part that interest and co-operation which will secure to future generations of the poor those comforts which, with the blessing of Providence, it is my object to bestow upon them."

At a meeting of noblemen and gentlemen, held in the Discussion-rooms of the Metropolitan Club, there was a full attendance to consider the subject of dwellings for the working classes. The Marquis Townshend was voted to the chair; and Lord Ebury, the Right Hon. W. F. Cowper, M.P., Mr. Arthur Otway, M.P., and other gentlemen were present.

Letters from the Bishop of London, Lord Stanley, and others, sympathising with the object of the meeting, and expressing regret at being unable to attend, were read; and then

Mr. W. H. Robinson explained the plans of a company uniting the efforts of the moneyed and the working classes in the following manner:—The capital to be 100,000*l.*, with power to increase, divided into shares of 10*l.* each. The shares to be of two classes, the first payable by calls during two years, so as to be taken up by capitalists or others; the second to be payable by weekly instalments, to suit the working men; the management to be in the hands of trustees, and directors to be elected by the shareholders; the houses to be erected chiefly for dwellings in flats, upon improved designs; small houses also to be erected in the suburbs; the buildings to be mortgaged or sold when built, and the proceeds applied in the erection of additional buildings; working men to have the opportunity, by relinquishing shares or otherwise, to purchase their own tenement; the whole operations to be based on purely commercial principles. Mr. Robinson stated that this plan had been approved by a large public meeting at Lambeth in November, and that a committee of working men had since been occupied in arranging details. They would make their report to a second public meeting at Lambeth Baths. What was wanted now was the co-operation of gentlemen of wealth and position to supplement the endeavours of the working men.

The meeting at the Lambeth Baths was also presided over by the Marquis of Townshend, in the absence of the Earl of Shaftesbury. At this meeting the report from the committee was received and adopted. There was a very large attendance. The chairman was supported by a number of the vestrymen and influential inhabitants of the south of London. The Rev. T. B. Owen moved the following resolution:—"That in order to meet the pressing need for house accommodation in London, it is, in the opinion of this meeting, desirable that immediate steps be taken to form a company under the Limited Liability Act, for the purpose of erecting improved dwelling-houses for the working classes, and that this meeting pledges itself to support such a company." This was carried, together with another appointing a committee to carry out the formation of the company.

The fifth ordinary general meeting of the Improved Industrial Dwellings Company was held in the Mansion-house, on Saturday, Mr. Alderman Waterlow in the chair. Among the gentlemen present were Sir Charles Fox, Mr. J. L. Briscoe, M.P., Aldermen Finnis and Stone, &c.

From the report for the last half-year it appears that the lease of a valuable piece of land, situated in City Garden-row, City-road, has been secured for the company, and three blocks of buildings are in course of erection thereon, which will, when completed, comprise ample accommodation for about seventy-two families. This will involve an expenditure of about 9,600*l.*, towards which about 6,500*l.* have been subscribed. It is expected that these dwellings will be completed and ready for occupation by midsummer next. The directors report that the whole of the property of the company comprised in the four estates mentioned in previous reports at Wapping, Southwark, Bagnigge Wells, and King's Cross, are fully completed and occupied at the present date. The directors proposed payment of a dividend at the rate of five per cent. per annum upon the paid-up capital, and in concluding regretted to state that Lord Stanley had been necessitated, by the pressure of legislative and other duties, to retire from his position as chairman of the company. In doing so his lordship assigned his shares, to the amount of 1,000*l.*, for the benefit of certain charities at King's Lynn. On the remainder of the present capital being subscribed, the directors contemplated extending the basis of the company by the issue of shares of less nominal value than at present, and it was thought that by this means working men may be induced to invest their savings, and gradually acquire an interest in the company.

The weekly rental now accruing to the company is about 63*l.* 7*s.*, giving a gross rental of 3,294*l.* 4*s.* It was often remarked that a large number of small rents were difficult to collect, but there had only been 29*s.* of bad debts since the company was originated.

In addition to what we have already stated, we may mention that a deputation, representing several of the metropolitan Boards of Guardians, carrying out resolutions to which we adverted in our last, had an interview on Tuesday afternoon with the Right Hon. C. P. Villiers, M.P., president of the Poor-law Board, respecting the dwellings of the poorer classes in London. Lord Enfield, Mr. Lumley, Mr. Farnall, Poor-law commissioner, and Mr. Rawlinson, sanitary commissioner, were also present. The memorial presented pointed to the fact, that for the new law courts 3,082 persons of the labouring classes and poor would be removed, in addition to 1,093 persons not of the labouring class, and that no provision had been made for compensation to these poor persons about to be deprived of their lodgings, or for their future accommodation. Railway and other works being so destructive of small house property, it was unsafe to rely wholly upon either the usual "supply and demand" hypothesis, or on the exertions of philanthropists, and that the Government which sanctions the removal of the poor man's home should in some way make provision for his future dwelling-place. Without offering any suggestions themselves, they directed attention to the three following recommendations of the report of the committee of the Society of Arts on Dwellings for the Labouring Classes:—

"1. That corporations, limited owners, &c., should have increased power to sell land for the erection of dwellings for labourers, under conditions as to proper drainage, ventilation, and sanitary regulations. 2. That the Public Loan Commissioners should be authorised to lend money, at a rate not exceeding 3½ per cent. per annum, for building dwellings for the labouring classes, under suitable guarantees, and with due regard to sanitary arrangements. 3. That in all future Railway Acts and Acts for Local Improvements, when houses inhabited by the working classes are destroyed under compulsory powers, such companies should be compelled to provide, within a convenient distance, other dwellings in lieu of those destroyed."

Mr. Villiers promised the attention of the Government to the subject.

FALL OF ROOF, LONDON-ROAD STATION, MANCHESTER.

On the 7th inst. the City Coroner, concluded the inquest on the bodies of Thomas Garston Sherwood and Mark Russell, who were killed by the falling, on the 23rd ult., of part of the large iron roof that is being constructed at the London-road Railway Station. Elaborate reports were made by Mr. Brunlees, C.E., and by Capt. Tyler. After a long inquiry, the jury returned a verdict of Accidental Death.

Mr. Brunlees, in his report, said,—

"The roof in course of erection is 656 ft. long and 190 ft. wide, the width being divided into two spans of 95 ft. each. It is supported longitudinally by three lines of lattice girders 6 ft. in depth, divided into eight bays by the cast-iron columns upon which the girders are carried. Six of these bays, forming the portion still standing, are of the following spans:—The three first, beginning at the booking-office or west end, are 77 ft. 10 in. each; the fourth, 76 ft.; the fifth and sixth, 78 ft. 5 in. each. The two remaining bays were 88 ft. 4 in. each. The bay which fell was the seventh from the west end, and the last or eighth was subsequently taken down. With regard to the main roof itself, I calculate the weight of the structure to be 13½ tons on each principal, and, adding to this the pressure due to a high gale of wind, and the weight of 12 in. of snow, the maximum load on any principal would be 26 tons. Under this load, no part of the roof is subjected to a greater strain in tension than 4 tons per square inch, and no greater strain in compression than 2 tons per square inch. All the work is well executed, and the materials are of good quality. I am therefore satisfied that the roof itself is amply strong, and did not in any way contribute to the cause of the accident. Of the three lines of girders supporting the roof, the outer ones rest upon the side walls of the station, consequently there can be no question as to their sufficiency. Respecting the centre line of girders, I will first of all state the results of my investigation of the portion now standing, the largest spans of which are 78 ft. 5 in., being the two immediately on the west side of that which fell. The load on these girders due to the weight of the structure is 79·75 tons each, to which I add 12 tons as the vertical pressure due to wind and snow, making a maximum load of 91·75 tons. With this load the strain on the top flange of the girder will be 4·4 tons per square inch in compression; on the bottom flange, 5·6 tons per square inch in tension; on the cast-iron vertical struts, 3·2 and 1·6 tons respectively in compression; and on the diagonal bars between each strut, 8·5 and 7 tons respectively in tension. The vertical pressure on the end castings which connect the girder with the columns is 2·64 tons per square inch. The strains on the diagonal bars are somewhat greater than I consider advisable, and the use of cast-iron in forming the connexion between the girders and the columns is certainly not advisable. The cast-iron end pieces, as before stated, have only to carry 2·64 tons per square inch of vertical pressure, but when the girder deflects, or it may be buckles, a transverse strain is brought upon them which they are not calculated to resist with certainty. All these girders are and have been since the accident temporarily propped, and I consider that they should be permanently strengthened. Proceeding now to the girder in the bay which fell, I will first state the strains to which it would have been subjected with the completed roof and an allowance for wind and snow. The weight due to the structure would be 98·4 tons, to which I add for wind and snow 15 tons, making a maximum load of 113·4 tons. With this load there would be a strain on the top flange of 4·7 tons per square inch in compression, a strain of 6·4 tons per square inch on the bottom flange in tension, strains on the struts of 3·9, 2·4, and 1·6 tons respectively in compression, and strains on the diagonals of 9·5, 8, and 4 tons respectively in tension. The vertical pressure on the end castings would be 3·3 tons per square inch. The same observations which I have made with regard to the main roof itself, I calculate the weight of the structure to be 13½ tons on each principal, and, adding to this the pressure due to a high gale of wind, and the weight of 12 in. of snow, the maximum load on any principal would be 26 tons. Under this load, no part of the roof is subjected to a greater strain in tension than 4 tons per square inch, and no greater strain in compression than 2 tons per square inch. All the work is well executed, and the materials are of good quality. I am therefore satisfied that the roof itself is amply strong, and did not in any way contribute to the cause of the accident. Of the three lines of girders supporting the roof, the outer ones rest upon the side walls of the station, consequently there can be no question as to their sufficiency. Respecting the centre line of girders, I will first of all state the results of my investigation of the portion now standing, the largest spans of which are 78 ft. 5 in., being the two immediately on the west side of that which fell. The load on these girders due to the weight of the structure is 79·75 tons each, to which I add 12 tons as the vertical pressure due to wind and snow, making a maximum load of 91·75 tons. With this load the strain on the top flange of the girder will be 4·4 tons per square inch in compression; on the bottom flange, 5·6 tons per square inch in tension; on the cast-iron vertical struts, 3·2 and 1·6 tons respectively in compression; and on the diagonal bars between each strut, 8·5 and 7 tons respectively in tension. The vertical pressure on the end castings which connect the girder with the columns is 2·64 tons per square inch. The strains on the diagonal bars are somewhat greater than I consider advisable, and the use of cast-iron in forming the connexion between the girders and the columns is certainly not advisable. The cast-iron end pieces, as before stated, have only to carry 2·64 tons per square inch of vertical pressure, but when the girder deflects, or it may be buckles, a transverse strain is brought upon them which they are not calculated to resist with certainty. All these girders are and have been since the accident temporarily propped, and I consider that they should be permanently strengthened. Proceeding now to the girder in the bay which fell, I will first state the strains to which it would have been subjected with the completed roof and an allowance for wind and snow. The weight due to the structure would be 98·4 tons, to which I add for wind and snow 15 tons, making a maximum load of 113·4 tons. With this load there would be a strain on the top flange of 4·7 tons per square inch in compression, a strain of 6·4 tons per square inch on the bottom flange in tension, strains on the struts of 3·9, 2·4, and 1·6 tons respectively in compression, and strains on the diagonals of 9·5, 8, and 4 tons respectively in tension. The vertical pressure on the end castings would be 3·3 tons per square inch. The same observations which I have made with regard to the 78 ft. 5 in. span as to the strains on the diagonals and the defective connection with the columns, apply with equal force to this girder. It now remains to consider the load on the girder, and the strains to which it was subjected at the time of the accident. I estimate the load then upon the girder at 88·49 tons. With this load the strain on the top flange would be 3·7 tons per square inch in compression, the strain on the bottom flange would be 5 tons per square inch in tension, the strains on the struts would be 3·3, 1·9, 1·2, 1·9, and 2·9 tons per square inch respectively in compression, and the strains on the diagonals would be 9·0, 7·9, 3·0, 3·0, 6·7, and 7·7 tons per square inch respectively in tension. The vertical pressure on the end castings would be 2·8 and 2·4 tons per square inch respectively in compression. It will be observed that the strains on the diagonals are excessive even with a partial load. I am not, however, of opinion that the excess was sufficient to cause a sudden failure of the

girder, but it would cause a great deflection. I found the girder well put together, and the iron is of good quality. I have before stated that I consider the connexion between the girders and the columns defective. This connexion is made in the following manner:—The ends of the girder are formed of cast-iron vertical struts, which are attached to the top and bottom flanges by 1¼ in. bolts passing through the angle irons and the struts. The girder rested on a projection on the column 3 in. wide, and was bolted to the column by four 1¼-in. bolts passing through lugs on the end casting, through the column, and through similar lugs on the end casting of the girder of the next bay. After the girder was in its place and bolted up, a wrought-iron key was driven in grooves formed for the purpose between the column and the end casting. The ultimate cause of the accident was the fracture of the end castings, which left the girder unsupported except by the small projection on the column under the bottom flange, which was of no value inasmuch as the whole vertical pressure is taken at the top of the end castings. Although the ultimate cause of the accident is apparent, we have no actual evidence to show the primary causes, but these may be assumed to be threefold. First, we have a girder with a tendency to deflect to a great extent from the very flat angle at which the diagonal bars are placed, and the small amount of metal in these bars. Second, the girder is weak laterally, and buckling may have caused an undue strain on the end castings. Third, the high gales immediately preceding the accident may have bent the girder laterally, and produced a nipping strain on the castings. In my opinion, any one of these causes, or probably all of them combined, acting with the leverage due to half the length of the girder, have produced such an undue strain upon the end castings as to cause their fracture. But, whatever may have been the circumstances which immediately produced the failure of the girder, it is evident that the introduction of cast-iron was the main defect in its construction, and led to the accident."

MARYLEBONE.

THE monthly report on the health of the parish of Saint Marylebone during January, 1866, by John Whitmore, M.D., medical officer of health, and chemical examiner of gas for the parish, has been printed by order of the vestry. The health of the district is not so bad as to require notice. Under the head of open spaces, and in respect to that portion of the old parochial burial-ground, which lies on the north side of Paddington-street, the reporter says:—"The amount of space which it occupies cannot be much less than an acre and a half, and I have often thought, how great would be the improvement and how little the desecration, if all the tombstones were levelled, as they are in St. Margaret's churchyard, Westminster, and the entire space converted into a recreation ground for the children of the poor in the neighbourhood. In the filthy, densely crowded courts which abut upon this space, more particularly York-court, there are scores of young children pining away for the want of fresh air, to whom a romp in the sunshine would be a source of infinite delight," and enable them to "pick up—so to speak—during the day time in the open air, strength enough (and to spare) to resist the baneful effects of the foul atmosphere which they breathe at night, and by such means materially increase their chances of growing up into vigorous maturity."

METROPOLITAN BOARD OF WORKS.

VENTILATION OF SEWERS: EMBANKMENTS.

AT a recent meeting of the Board, a report was brought up from the Main Drainage Committee recommending that the committee be authorised to offer a premium of 250 guineas for the best plan for neutralizing and rendering harmless the offensive and poisonous gases in sewers. It was moved as an amendment, "That inasmuch as a large sum of money has been recently expended in the Main Drainage works of the metropolis, it is not at present expedient to incur any further expense, until, after a fair trial of them, it is shown that offensive gases are generated in the sewers after the Main Drainage works are completed." After some discussion, the chairman put the question, when there appeared for the motion 14, against it 13; but as this did not constitute a majority of the members present (the chairman not voting), there was no order upon the question.

The chief engineer presented his monthly report on the progress of the works of the Thames Embankment, Low-level Sewer, North, &c.:—

"*North Side of the Thames.*—Thames Embankment (Contract No. 1) between Westminster and Waterloo Bridges.—The works that have been executed in connexion with this contract comprise about 3,391 ft. in length of timber and iron caisson dams, either completed or in various stages of progress. The completed works comprise about 1,347 ft. in length of the Low-level Sewer, 284 ft. of the sewer for intercepting the smaller drains formerly discharging on the foreshore of the river, and 916 ft. of the subway. About 409,000 cubic yards of earth and other like materials, obtained partly from the land and partly from the river, have been filled in behind the walls and in the embankment generally. The approximate cost of the work done, materials on the ground, and plant, is 265,003*l.*, or 13,633*l.* in excess of the previous month, but a portion of this sum is, however, due to progress made prior to the past month. Of the total amount the proportionate sum of 161,424*l.* is for works, 51,915*l.* for materials, and 51,664*l.* for plant.

Thames Embankment (Contract No. 2) between Waterloo Bridge and Temple Gardens.—During the past month, within the completed dams in front of Somerset House and the Temple steamboat-pier, 909 cubic yards of concrete have been deposited, 60 rods of brickwork built, and 7,538 cubic feet of granite bedded. The eastern dam will shortly be completed. About 3,546 cubic yards of good binding material have been filled in for the 20-ft. backing. The approximate value of the works completed, and of the materials and plant on the ground is 169,350*l.*, of which the sum of 5,468*l.* is due to the progress made within the past month. Of the total month the proportionate sum of 131,703*l.* is for work done, 17,630*l.* for materials, and 20,017*l.* for plant.

Low-level Sewer.—About 607 ft. of the main line and 134 ft. of the Old Ford branch sewer have been completed in the past month, making a total length of nearly 4¼ miles of sewers constituted under this contract, the approximate value of which is 185,361*l.*, or 6,940*l.* for the work done in the past month.

Abbey Mills Pumping Station.—The internal and external walls have been built up to an average height of 7 ft. above the concrete, and sixteen holding-down stones, containing in all 1,000 cubic feet of Bramley stone, have been prepared, dressed, and bedded. The quantity of concrete deposited outside the walls, and within the vacant spaces inside the buildings, is 844 yards, and the number of rods of brickwork built, 197 yards. The approximate value of the work completed is 16,173*l.*, of which the sum of 2,041*l.* represents the progress made in the past month. Portions of the machinery continue to arrive on the ground from Messrs. Rothwell's foundry.

South Side of the Thames.—Thames Embankment (Contract No. 1).—About 1,365 ft. run of piling in the dam, and 1,600 ft. in the staging, have been driven to an average depth of 16 ft. About 149,000 cubic feet of timber and 77 tons of cast-iron pile-shores have been used in this work, and there are about 41,000 cubic feet of timber on the ground ready for use. The approximate value of these preliminary works is estimated at 20,000*l.*

J. W. BAZALGETTE, Engineer."

This report was received and ordered to be entered on the minutes.

Several other matters were disposed of, and the Board adjourned.

At the last meeting of the Metropolitan Board of Works, the tenders for the deepening and reconstructing the Grove Sewer, Hammersmith, and for constructing a new sewer in High-street, Fulham, were as follow:—Mr. J. C. Pearce, 7,057*l.*; Messrs. J. and S. Williams, 7,000*l.*; Mr. Edward Redding, 7,553*l.*; Mr. Edward Thirsk, 9,000*l.*; Mr. James Bloomfield, 9,500*l.*; Mr. Joseph Niblett, 8,500*l.* On the motion of Mr. Freeman, the tender of Messrs. J. & S. Williams was accepted, subject to the usual inquiries.

PROPOSED BUILDERS' CLERKS' SOCIETY.

READERS who are interested in the endeavour to establish a "Builders' Clerks' Society," to aid the necessitous aged and fatherless, have doubtless noticed that a meeting is to be held, for the expression of opinions, in the school-room, Peter-street, Bishopsgate-street, on this, Saturday, the 17th inst., at five o'clock. We mention it again, nevertheless. The desirability of joining it to some existing society will doubtless be discussed with other obvious propositions. Why should not the Builders' Benevolent Institution supply the want, and so save the cost of fresh staff and meeting-place?

BETHNAL GREEN AGAIN!

ANOTHER death has been caused by the dens here, that of Mary Clarke, otherwise White, aged 36 years, at No. 3, Reform-square. The house No. 2 in that *square* was occupied by nine persons—all had the fever, and the father was dead. At the door of No. 3 stood, when the jury visited it, a boy, who took off his cap, and showed that all his hair had been shaved off for fever. He stated that twelve persons occupied the house, and that seven of them had typhus. Mr. F. J. Gant, pathological anatomist to the Royal Free Hospital, said that he made a post-mortem examination of the body of the deceased, and found the cause of death to be disease of the brain. But the condition of the place in which she lived would tend to accelerate death. Defective drainage, the accummulation of vegetable and other refuse, and the state of the closets would produce typhoid fever. Typhus and typhoid fevers were eminently preventible diseases. Mr. George Haycock said that he was divisional surgeon of Bethnal-green. He had attended persons in four houses in that square. Typhus and typhoid had been raging there. He had eighteen cases in two houses. He inserted the facts about Reform-square in his medical relief-book, which he sent to the guardians about three months ago. The coroner, in summing up, said that it was manifest that the condition of the houses in question was such as to engender disease and cut short life. The jury returned a verdict,—

"That the deceased was found dead from the mortal effects of disease of the brain, and that her said death was accelerated by overcrowding, want of sufficient water supply, defective drainage, the dirty and unhealthy condition of the premises, and general neglect of sanitary arrangements: and the said jurors do further say that the intimation made by the medical officer of the district of the condition of the premises ought to have received immediate attention, and that greater facility should be afforded to the poor in obtaining medical orders in urgent cases."

ROYAL HORTICULTURAL SOCIETY.

THE general meeting of this society was held on Tuesday last, the Duke of Buccleuch, president, in the chair. The Report of the Council read congratulated the members on the improved position of the society as compared with its position last year. It said,—

"The Fellows will have remarked with pleasure that progress is being made towards the completion of the structures of the garden at South Kensington. A considerable portion of the spandrels of the arches of the Upper Arcades has been filled with terra-cotta bas-reliefs, and a contract has been accepted for the completion, before the out-door season commences, of the frieze ornamental work of the same arcades. This decoration, it will be remembered, forms a portion of the work undertaken at the commencement of last year by H. M.'s Commissioners for the Exhibition of 1851.

In their arrangements for the coming season the Council have endeavoured to work out the idea of uniting science and art. The past labours of this Society have been the source from which the other nations of Europe have chiefly derived their knowledge of the practice of sound gardening; and there is everything to encourage it in the endeavour to retain and increase the prestige it has already gained."

"It is with pleasure that the Council announce to the Fellows that the spacious hall for all kinds of meetings connected with the promotion of arts and sciences is about to be erected, under the patronage of the Queen and the presidency of the Prince of Wales, on the vacant site between the Conservatory and Hyde Park. It will be an amphitheatre like the Colosseum at Rome, capable of seating 6,000 persons with great comfort, and affording ample and suitable space for flower-shows and horticultural gatherings."

The advantages the Fellows will have in connexion with the forthcoming International Horticultural Exhibition were pointed out.

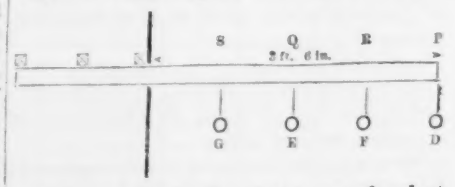
A discussion ensued as to the expediency of opening the gardens to the public for five days in the week during the months of September and October, at the charge of 3d. each for admission, as was done last year, and it was ultimately resolved that in lieu of that arrangement the gardens should be opened *free* to the public *one* day in each week during the two months named.

STRENGTH OF TIMBER BEAMS.

HEREWITH I forward, for insertion in the *Builder*, the results of some few experiments recently made by me, upon the strength of beams, to find a *practical* reply to the question put by "A Student," in page 878 of last year's volume.

A piece of yellow fir, 7 ft. 6 in. in length, and 2 in. square, was placed to represent a beam with its ends loose, having a clear span of 7 ft. between the supports. Two weights, ¾ cwt. each, were suspended as close as possible at the middle of the length. The deflection just exceeded an inch, being $\frac{21}{20}$. I call this, experiment A. When the two ¾ cwts. were placed half-way between the middle and one of the supports, the beam deflected at that point $\frac{13}{20}$; this I call B. When but one of the ¾ cwts. was placed there, it deflected at that point only $\frac{7}{20}$; this I call C.

The piece of wood was then shifted so as to project as an arm, for half its length, or 3 ft. 6 in. only. A rough diagram will explain the succeeding operations. One ¾ cwt. was placed at D, or *half the weight* applied in the case of A. The beam instantly deflected $\frac{42}{20}$, or just upon *double* of A. But noticing that the fixed half of the beam was being unduly strained, I had the arm shifted to a better bearing, and secured still



passages; 4th, slaughter-houses with putrid offal; 5th, poisonous gases from outer drains; 6th, defects in construction of dwellings; 7th midden steads. The causes of these modern plagues,—typhus and cholera,—are the same in their essential nature as the causes of the plagues of old, dirty persons, dirty dwellings, impure air, impure water, errors of drainage, overcrowding of houses and narrowing of lanes, with accumulation of filth, whether it be on the surface of your streets or behind the doors of slaughter-houses. The public health imperatively demands that supervision should be placed in experienced and enlightened if not in professional hands; for in this important matter technical skill and scientific knowledge are more or less essential, together with a large share of humanity and freedom from prejudices."

HOUSES FOR THE WORKING CLASSES.

AT a time when 16,000 houses, threatened by new railway Bills affecting the metropolis, may be doomed to follow thousands already demolished, it is gratifying to observe that the subject is exciting an increased interest, and that there is now a prospect of something worth speaking of being done towards the replacement of so many of the people's homes.

A Bill has been brought into Parliament to enable the Public Works Loan Commissioners to make advances towards the erection of dwellings for the labouring classes in populous places, and various meetings are being held, and proceedings taken, with the view of advancing the same important purpose of providing the working classes with improved substitutes for the dwellings of which they are being deprived.

Mr. Peabody, in the letter wherein he announced the noble gift of 100,000*l.*, in addition to the 150,000*l.* previously given, expresses his entire approval of what his trustees have done.

"Taking the joint capital of the two gifts, he remarks, at a minimum of 250,000*l.*, it will form a fund, the operation of which is intended to be progressive in its usefulness as applied to the relief of the poor of London (so correctly defined in your recent report), without exclusion in consequence of religious belief or political bias. It will, therefore, act more powerfully in future generations than in the present, and it is intended to endure for ever . . . .

It is my desire that my trustees for the time being may seek out and secure at such rates as the state of the fund may warrant, such freehold sites, within ten miles of the present Royal Exchange, as may appear eligible, both on account of salubrity of position and proximity to the great centres of labour and railroad accommodation, due regard being had to the probable burden of taxation . . . .

The trustees shall be at liberty, should they consider it needful, to set apart space adjacent to the building and suitable for school-houses for the children of the families holding tenements. But such schools must be so organised as carefully to exclude sectarian influences . . . .

As some of these dwellings will probably be at inconvenient distances from good markets, I would also suggest to my trustees to consider the propriety, in localities where it may seem to be required, of providing within the buildings, or near to them, apartments in which the tenants may organise co-operative stores for supplying themselves with coal and other necessary articles for their own consumption, subject to such regulations as, in the judgment of my trustees, may be needful . . . .

I entertain a strong and earnest hope that the project will so commend itself to the sympathies and judgment of the inhabitants of London, as to insure on their part that interest and co-operation which will secure to future generations of the poor those comforts which, with the blessing of Providence, it is my object to bestow upon them."

At a meeting of noblemen and gentlemen, held in the Discussion-rooms of the Metropolitan Club, there was a full attendance to consider the subject of dwellings for the working classes. The Marquis Townshend was voted to the chair; and Lord Ebury, the Right Hon. W. F. Cowper, M.P., Mr. Arthur Otway, M.P., and other gentlemen were present.

Letters from the Bishop of London, Lord Stanley, and others, sympathising with the object of the meeting, and expressing regret at being unable to attend, were read; and then

Mr. W. H. Robinson explained the plans of a company uniting the efforts of the moneyed and the working classes in the following manner:—The capital to be 100,000*l.*, with power to increase, divided into shares of 10*l.* each. The shares to be of two classes, the first payable by calls during two years, so as to be taken up by capitalists or others; the second to be payable by weekly instalments, to suit the working men; the management to be in the hands of trustees, and directors to be elected by the shareholders; the houses to be erected chiefly for dwellings in flats, upon improved designs; small houses also to be erected in the suburbs; the buildings to be mortgaged or sold when built, and the proceeds applied in the erection of additional buildings; working men to have the opportunity, by relinquishing shares or otherwise, to purchase their own tenement; the whole operations to be based on purely commercial principles. Mr. Robinson stated that this plan had been approved by a large public meeting at Lambeth in November, and that a committee of working men had since been occupied in arranging details. They would make their report to a second public meeting at Lambeth Baths. What was wanted now was the co-operation of gentlemen of wealth and position to supplement the endeavours of the working men.

The meeting at the Lambeth Baths was also presided over by the Marquis of Townshend, in the absence of the Earl of Shaftesbury. At this meeting the report from the committee was received and adopted. There was a very large attendance. The chairman was supported by a number of the vestrymen and influential inhabitants of the south of London. The Rev. T. B. Owen moved the following resolution:—"That in order to meet the pressing need for house accommodation in London, it is, in the opinion of this meeting, desirable that immediate steps be taken to form a company under the Limited Liability Act, for the purpose of erecting improved dwelling-houses for the working classes, and that this meeting pledges itself to support such a company." This was carried, together with another appointing a committee to carry out the formation of the company.

The fifth ordinary general meeting of the Improved Industrial Dwellings Company was held in the Mansion-house, on Saturday, Mr. Alderman Waterlow in the chair. Among the gentlemen present were Sir Charles Fox, Mr. J. L. Briscoe, M.P., Aldermen Finnis and Stone, &c.

From the report for the last half-year it appears that the lease of a valuable piece of land, situated in City Garden-row, City-road, has been secured for the company, and three blocks of buildings are in course of erection thereon, which will, when completed, comprise ample accommodation for about seventy-two families. This will involve an expenditure of about 9,600*l.*, towards which about 6,500*l.* have been subscribed. It is expected that these dwellings will be completed and ready for occupation by midsummer next. The directors report that the whole of the property of the company comprised in the four estates mentioned in previous reports at Wapping, Southwark, Bagnigge Wells, and King's Cross, are fully completed and occupied at the present date. The directors proposed payment of a dividend at the rate of five per cent. per annum upon the paid-up capital, and in concluding regretted to state that Lord Stanley had been necessitated, by the pressure of legislative and other duties, to retire from his position as chairman of the company. In doing so his lordship assigned his shares, to the amount of 1,000*l.*, for the benefit of certain charities at King's Lynn. On the remainder of the present capital being subscribed, the directors contemplated extending the basis of the company by the issue of shares of less nominal value than at present, and it was thought that by this means working men may be induced to invest their savings, and gradually acquire an interest in the company.

The weekly rental now accruing to the company is about 63*l.* 7*s.*, giving a gross rental of 3,294*l.* 4*s.* It was often remarked that a large number of small rents were difficult to collect, but there had only been 29*s.* of bad debts since the company was originated.

In addition to what we have already stated, we may mention that a deputation, representing several of the metropolitan Boards of Guardians, carrying out resolutions to which we adverted in our last, had an interview on Tuesday afternoon with the Right Hon. C. P. Villiers, M.P., president of the Poor-law Board, respecting the dwellings of the poorer classes in London. Lord Enfield, Mr. Lumley, Mr. Farnall, Poor-law commissioner, and Mr. Rawlinson, sanitary commissioner, were also present. The memorial presented pointed to the fact, that for the new law courts 3,082 persons of the labouring classes and poor would be removed, in addition to 1,093 persons not of the labouring class, and that no provision had been made for compensation to these poor persons about to be deprived of their lodgings, or for their future accommodation. Railway and other works being so destructive of small house property, it was unsafe to rely wholly upon either the usual "supply and demand" hypothesis, or on the exertions of philanthropists, and that the Government which sanctions the removal of the poor man's home should in some way make provision for his future dwelling-place. Without offering any suggestions themselves, they directed attention to the three following recommendations of the report of the committee of the Society of Arts on Dwellings for the Labouring Classes:—

"1. That corporations, limited owners, &c., should have increased power to sell land for the erection of dwellings for labourers, under conditions as to proper drainage, ventilation, and sanitary regulations. 2. That the Public Loan Commissioners should be authorised to lend money, at a rate not exceeding 3½ per cent. per annum, for building dwellings for the labouring classes, under suitable guarantees, and with due regard to sanitary arrangements. 3. That in all future Railway Acts and Acts for Local Improvements, when houses inhabited by the working classes are destroyed under compulsory powers, such companies should be compelled to provide, within a convenient distance, other dwellings in lieu of those destroyed."

Mr. Villiers promised the attention of the Government to the subject.

FALL OF ROOF, LONDON-ROAD STATION, MANCHESTER.

ON the 7th inst. the City Coroner, concluded the inquest on the bodies of Thomas Garston Sherwood and Mark Russell, who were killed by the falling, on the 23rd ult., of part of the large iron roof that is being constructed at the London-road Railway Station. Elaborate reports were made by Mr. Brunlees, C.E., and by Capt. Tyler. After a long inquiry, the jury returned a verdict of Accidental Death.

Mr. Brunlees, in his report, said,—

"The roof in course of erection is 656 ft. long and 190 ft. wide, the width being divided into two spans of 95 ft. each. It is supported longitudinally by three lines of lattice girders 6 ft. in depth, divided into eight bays by the cast-iron columns upon which the girders are carried. Six of these bays, forming the portion still standing, are of the following spans:—The three first, beginning at the booking-office or west end, are 77 ft. 10 in. each; the fourth, 76 ft.; the fifth and sixth, 78 ft. 5 in. each. The two remaining bays were 88 ft. 4 in. each. The bay which fell was the seventh from the west end, and the last or eighth was subsequently taken down. With regard to the main roof itself, I calculate the weight of the structure to be 13½ tons on each principal, and, adding to this the pressure due to a high gale of wind, and the weight of 12 in. of snow, the maximum load on any principal would be 26 tons. Under this load, no part of the roof is subjected to a greater strain in tension than 4 tons per square inch, and no greater strain in compression than 2 tons per square inch. All the work is well executed, and the materials are of good quality. I am therefore satisfied that the roof itself is amply strong, and did not in any way contribute to the cause of the accident. Of the three lines of girders supporting the roof, the outer ones rest upon the side walls of the station, consequently there can be no question as to their sufficiency. Respecting the centre line of girders, I will first of all state the results of my investigation of the portion now standing, the largest spans of which are 78 ft. 5 in., being the two immediately on the west side of that which fell. The load on these girders due to the weight of the structure is 79·75 tons each, to which I add 12 tons as the vertical pressure due to wind and snow, making a maximum load of 91·75 tons. With this load the strain on the top flange of the girder will be 4·4 tons per square inch in compression; on the bottom flange, 5·6 tons per square inch in tension; on the cast-iron vertical struts, 3·2 and 1·6 tons respectively in compression; and on the diagonal bars between each strut, 8·5 and 7 tons respectively in tension. The vertical pressure on the end castings which connect the girder with the columns is 2·64 tons per square inch. The strains on the diagonal bars are somewhat greater than I consider advisable, and the use of cast-iron in forming the connexion between the girders and the columns is certainly not advisable. The cast-iron end pieces, as before stated, have only to carry 2·64 tons per square inch of vertical pressure, but when the girder deflects, or it may be buckles, a transverse strain is brought upon them which they are not calculated to resist with certainty. All these girders are and have been since the accident temporarily propped, and I consider that they should be permanently strengthened. Proceeding now to the girder in the bay which fell, I will first state the strains to which it would have been subjected with the completed roof and an allowance for wind and snow. The weight due to the structure would be 98·4 tons, to which I add for wind and snow 15 tons, making a maximum load of 113·4 tons. With this load there would be a strain on the top flange of 4·7 tons per square inch in compression, a strain of 6·4 tons per square inch on the bottom flange in tension, strains on the struts of 3·9, 2·4, and 1·6 tons respectively in compression, and strains on the diagonals of 9·5, 8, and 4 tons respectively in tension. The vertical pressure on the end castings would be 3·3 tons per square inch. The same observations which I have made with regard to the 78 ft. 5 in. span as to the strains on the diagonals and the defective connection with the columns, apply with equal force to this girder. It now remains to consider the load on the girder, and the strains to which it was subjected at the time of the accident. I estimate the load then upon the girder at 88·49 tons. With this load the strain on the top flange would be 3·7 tons per square inch in compression, the strain on the bottom flange would be 5 tons per square inch in tension, the strains on the struts would be 3·3, 1·9, 1·2, 1·9, and 2·9 tons per square inch respectively in compression, and the strains on the diagonals would be 9·0, 7·9, 3·0, 3·0, 6·7, and 7·7 tons per square inch respectively in tension. The vertical pressure on the end castings would be 2·8 and 2·4 tons per square inch respectively in compression. It will be observed that the strains on the diagonals are excessive even with a partial load. I am not, however, of opinion that the excess was sufficient to cause a sudden failure of the

girder, but it would cause a great deflection. I found the girder well put together, and the iron is of good quality. I have before stated that I consider the connexion between the girders and the columns defective. This connexion is made in the following manner:—The ends of the girder are formed of cast-iron vertical struts, which are attached to the top and bottom flanges by 1¼ in. bolts passing through the angle irons and the struts. The girder rested on a projection on the column 3 in. wide, and was bolted to the column by four 1¼-in. bolts passing through lugs on the end casting, through the column, and through similar lugs on the end casting of the girder of the next bay. After the girder was in its place and bolted up, a wrought-iron key was driven in grooves formed for the purpose between the column and the end casting. The ultimate cause of the accident was the fracture of the end castings, which left the girder unsupported except by the small projection on the column under the bottom flange, which was of no value inasmuch as the whole vertical pressure is taken at the top of the end castings. Although the ultimate cause of the accident is apparent, we have no actual evidence to show the primary causes, but these may be assumed to be threefold. First, we have a girder with a tendency to deflect to a great extent from the very flat angle at which the diagonal bars are placed, and the small amount of metal in these bars. Second, the girder is weak laterally, and buckling may have caused an undue strain on the end castings. Third, the high gales immediately preceding the accident may have bent the girder laterally, and produced a nipping strain on the castings. In my opinion, any one of these causes, or probably all of them combined, acting with the leverage due to half the length of the girder, have produced such an undue strain upon the end castings as to cause their fracture. But, whatever may have been the circumstances which immediately produced the failure of the girder, it is evident that the introduction of cast-iron was the main defect in its construction, and led to the accident."

MARYLEBONE.

THE monthly report on the health of the parish of Saint Marylebone during January, 1866, by John Whitmore, M.D., medical officer of health, and chemical examiner of gas for the parish, has been printed by order of the vestry. The health of the district is not so bad as to require notice. Under the head of open spaces, and in respect to that portion of the old parochial burial-ground, which lies on the north side of Paddington-street, the reporter says:—"The amount of space which it occupies cannot be much less than an acre and a half, and I have often thought, how great would be the improvement and how little the desecration, if all the tombstones were levelled, as they are in St. Margaret's churchyard, Westminster, and the entire space converted into a recreation ground for the children of the poor in the neighbourhood. In the filthy, densely crowded courts which abut upon this space, more particularly York-court, there are scores of young children pining away for the want of fresh air, to whom a romp in the sunshine would be a source of infinite delight," and enable them to "pick up—so to speak—during the day time in the open air, strength enough (and to spare) to resist the baneful effects of the foul atmosphere which they breathe at night, and by such means materially increase their chances of growing up into vigorous maturity."

METROPOLITAN BOARD OF WORKS.

VENTILATION OF SEWERS: EMBANKMENTS.

AT a recent meeting of the Board, a report was brought up from the Main Drainage Committee recommending that the committee be authorised to offer a premium of 250 guineas for the best plan for neutralizing and rendering harmless the offensive and poisonous gases in sewers. It was moved as an amendment, "That inasmuch as a large sum of money has been recently expended in the Main Drainage works of the metropolis, it is not at present expedient to incur any further expense, until, after a fair trial of them, it is shown that offensive gases are generated in the sewers after the Main Drainage works are completed." After some discussion, the chairman put the question, when there appeared for the motion 14, against it 13; but as this did not constitute a majority of the members present (the chairman not voting), there was no order upon the question.

The chief engineer presented his monthly report on the progress of the works of the Thames Embankment, Low-level Sewer, North, &c.:—

"*North Side of the Thames.*—Thames Embankment (Contract No. 1) between Westminster and Waterloo Bridges.—The works that have been executed in connexion with this contract comprise about 3,391 ft. in length of timber and iron caisson dams, either completed or in various stages of progress. The completed works comprise about 1,347 ft. in length of the Low-level Sewer, 284 ft. of the sewer for intercepting the smaller drains formerly discharging on the foreshore of the river, and 916 ft. of the subway. About 409,600 cubic yards of earth and other like materials, obtained partly from the land and partly from the river, have been filled in behind the walls and in the embankment generally. The approximate cost of the work done, materials on the ground, and plant, is 265,003*l.*, or 13,633*l.* in excess of the previous month, but a portion of this sum is, however, due to progress made prior to the past month. Of the total amount the proportionate sum of 161,424*l.* is for works, 51,915*l.* for materials, and 51,664*l.* for plant.

Thames Embankment (Contract No. 2) between Waterloo Bridge and Temple Gardens.—During the past month, within the completed dams in front of Somerset House and the Temple steamboat-pier, 909 cubic yards of concrete have been deposited, 60 rods of brickwork built, and 7,538 cubic feet of granite bedded. The eastern dam will shortly be completed. About 3,546 cubic yards of good binding material have been filled in for the 20-ft. backing. The approximate value of the works completed, and of the materials and plant on the ground is 169,350*l.*, of which the sum of 5,468*l.* is due to the progress made within the past month. Of the total month the proportionate sum of 131,703*l.* is for work done, 17,639*l.* for materials, and 20,017*l.* for plant.

Low-level Sewer.—About 607 ft. of the main line and 134 ft. of the Old Ford branch sewer have been completed in the past month, making a total length of nearly 4¼ miles of sewers constituted under this contract, the approximate value of which is 185,361*l.*, or 6,940*l.* for the work done in the past month.

Abbey Mills Pumping Station.—The internal and external walls have been built up to an average height of 7 ft. above the concrete, and sixteen holding-down stones, containing in all 1,000 cubic feet of Bramley stone, have been prepared, dressed, and bedded. The quantity of concrete deposited outside the walls, and within the vacant spaces inside the buildings, is 844 yards, and the number of rods of brickwork built, 197 yards. The approximate value of the work completed is 16,173*l.*, of which the sum of 2,041*l.* represents the progress made in the past month. Portions of the machinery continue to arrive on the ground from Messrs. Rothwell's foundry.

South Side of the Thames.—Thames Embankment (Contract No. 1).—About 1,365 ft. run of piling in the dam, and 1,600 ft. in the staging, have been driven to an average depth of 16 ft. About 149,000 cubic feet of timber and 77 tons of cast-iron pile-shores have been used in this work, and there are about 41,000 cubic feet of timber on the ground ready for use. The approximate value of these preliminary works is estimated at 20,000*l.*

J. W. BAZALGETTE, Engineer."

This report was received and ordered to be entered on the minutes.

Several other matters were disposed of, and the Board adjourned.

At the last meeting of the Metropolitan Board of Works, the tenders for the deepening and reconstructing the Grove Sewer, Hammersmith, and for constructing a new sewer in High-street, Fulham, were as follow:—Mr. J. C. Pearce, 7,057*l.*; Messrs. J. and S. Williams, 7,000*l.*; Mr. Edward Redding, 7,553*l.*; Mr. Edward Thirsk, 9,000*l.*; Mr. James Bloomfield, 9,500*l.*; Mr. Joseph Niblett, 8,500*l.* On the motion of Mr. Freeman, the tender of Messrs. J. & S. Williams was accepted, subject to the usual inquiries.

PROPOSED BUILDERS' CLERKS' SOCIETY.

READERS who are interested in the endeavour to establish a "Builders' Clerks' Society," to aid the necessitous aged and fatherless, have doubtless noticed that a meeting is to be held, for the expression of opinions, in the school-room, Peter-street, Bishopsgate-street, on this, Saturday, the 17th inst., at five o'clock. We mention it again, nevertheless. The desirability of joining it to some existing society will doubtless be discussed with other obvious propositions. Why should not the Builders' Benevolent Institution supply the want, and so save the cost of fresh staff and meeting-place?

BETHNAL GREEN AGAIN!

ANOTHER death has been caused by the dens here, that of Mary Clarke, otherwise White, aged 36 years, at No. 3, Reform-square. The house No. 2 in that *square* was occupied by nine persons—all had the fever, and the father was dead. At the door of No. 3 stood, when the jury visited it, a boy, who took off his cap, and showed that all his hair had been shaved off for fever. He stated that twelve persons occupied the house, and that seven of them had typhus. Mr. F. J. Gant, pathological anatomist to the Royal Free Hospital, said that he made a post-mortem examination of the body of the deceased, and found the cause of death to be disease of the brain. But the condition of the place in which she lived would tend to accelerate death. Defective drainage, the accumulation of vegetable and other refuse, and the state of the closets would produce typhoid fever. Typhus and typhoid fevers were eminently preventible diseases. Mr. George Haycock said that he was divisional surgeon of Bethnal-green. He had attended persons in four houses in that square. Typhus and typhoid had been raging there. He had eighteen cases in two houses. He inserted the facts about Reform-square in his medical relief-book, which he sent to the guardians about three months ago. The coroner, in summing up, said that it was manifest that the condition of the houses in question was such as to engender disease and cut short life. The jury returned a verdict,—

"That the deceased was found dead from the mortal effects of disease of the brain, and that her said death was accelerated by overcrowding, want of sufficient water supply, defective drainage, the dirty and unhealthy condition of the premises, and general neglect of sanitary arrangements: and the said jurors do further say that the intimation made by the medical officer of the district of the condition of the premises ought to have received immediate attention, and that greater facility should be afforded to the poor in obtaining medical orders in urgent cases."

ROYAL HORTICULTURAL SOCIETY.

THE general meeting of this society was held on Tuesday last, the Duke of Buccleuch, president, in the chair. The Report of the Council read congratulated the members on the improved position of the society as compared with its position last year. It said,—

"The Fellows will have remarked with pleasure that progress is being made towards the completion of the structures of the garden at South Kensington. A considerable portion of the spandrels of the arches of the Upper Arcades has been filled with terra-cotta bas-reliefs, and a contract has been accepted for the completion, before the out-door season commences, of the frieze ornamental work of the same arcades. This decoration, it will be remembered, forms a portion of the work undertaken at the commencement of last year by H. M.'s Commissioners for the Exhibition of 1851.

In their arrangements for the coming season the Council have endeavoured to work out the idea of uniting science and art. The past labours of this Society have been the source from which the other nations of Europe have chiefly derived their knowledge of the practice of sound gardening; and there is everything to encourage it in the endeavour to retain and increase the prestige it has already gained."

"It is with pleasure that the Council announce to the Fellows that the spacious hall for all kinds of meetings connected with the promotion of arts and sciences is about to be erected, under the patronage of the Queen and the presidency of the Prince of Wales, on the vacant site between the Conservatory and Hyde Park. It will be an amphitheatre like the Colosseum at Rome, capable of seating 6,000 persons with great comfort, and affording ample and suitable space for flower-shows and horticultural gatherings."

The advantages the Fellows will have in connexion with the forthcoming International Horticultural Exhibition were pointed out.

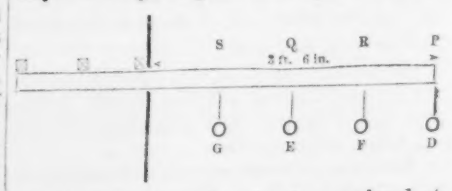
A discussion ensued as to the expediency of opening the gardens to the public for five days in the week during the months of September and October, at the charge of 3d. each for admission, as was done last year, and it was ultimately resolved that in lieu of that arrangement the gardens should be opened *free* to the public *one* day in each week during the two months named.

STRENGTH OF TIMBER BEAMS.

HEREWITH I forward, for insertion in the *Builder*, the results of some few experiments recently made by me, upon the strength of beams, to find a *practical* reply to the question put by "A Student," in page 878 of last year's volume.

A piece of yellow fir, 7 ft. 6 in. in length, and 2 in. square, was placed to represent a beam with its ends loose, having a clear span of 7 ft. between the supports. Two weights, ¾ cwt. each, were suspended as close as possible at the middle of the length. The deflection just exceeded an inch, being $\frac{21}{20}$. I call this, experiment A. When the two ¾ cwts. were placed half-way between the middle and one of the supports, the beam deflected at that point $\frac{12}{20}$; this I call B. When but one of the ¾ cwts. was placed there, it deflected at that point only $\frac{7}{20}$; this I call C.

The piece of wood was then shifted so as to project as an arm, for half its length, or 3 ft. 6 in. only. A rough diagram will explain the succeeding operations. One ¾ cwt. was placed at D, or *half the weight* applied in the case of A. The beam instantly deflected $\frac{12}{20}$, or just upon *double* of A. But noticing that the fixed half of the beam was being unduly strained, I had the arm shifted to a better bearing, and secured still



more firmly. On being tested again with the same weight, it deflected $\frac{24}{25}$, or *almost three-quarters more* than that of the beam A.

Applying the same weight at E, that is, in the middle of the length of the arm, the arm deflected at that point $\frac{12\cdot5}{20}$. With the like weight placed at F, the deflection at that point was $\frac{21\cdot5}{20}$. With the same weight at G, the deflection at that point was $\frac{5}{20}$.

Again placed loose on its supports, 7ft. apart, the beam was loaded at two points dividing the length into three equal parts, the deflection in the middle of the length of the beam was $\frac{16}{20}$, with one $\frac{1}{4}$ cwt. at each point (H). But with the $\frac{3}{4}$ cwt. at each point, the deflection was $\frac{18}{20}$ (I). The beam was, as a last trial, again proved with the weights as in A, with the same result as at first, indicating that the elasticity had not been affected, and that no deduction for loss of power is to be made from the various results.

The two main results, then, are,—I, that the beam deflected $\frac{8}{20}$ with $1\frac{1}{4}$ cwt.; and, II, that the arm of half the length deflected $\frac{23}{20}$ with $\frac{3}{4}$ cwt., or equal to 1·8 in.

Not having Fenwick's work mentioned by Mr. Tarn (p. 895 of last year's volume), I cannot work out the formula given by him, as the letters E and I are not explained; but Gregory's "Mechanics for Practical Men," edit. 1862, p. 388, gives the formula $\frac{432 \cdot l^3 \cdot w}{m \cdot b \cdot d^3} = D$. Working this out in the case of the beam in question, I obtain the formula in figures $\frac{432 \times 343 \text{ ft.} \times 168 \text{ lb.}}{\left\{\begin{array}{l}2{,}016{,}000 \text{ lb.} \times 2 \text{ in.} \times 8 \text{ in.} \\ \text{(red or yellow fir)}\end{array}\right.} = D$, or deflection in inches: that is, deflection = ·77175. Or, if 1,460,000 for m be taken, as given as the lowest quantity for red pine, by Rankine, in "Civil Engineering," the result is 1·065,—a quantity not differing so very much from the experiment which showed a full inch.

Now where does science teach me the amount of the deflection of the arm? Barlow said, until 1851, that it would be *double* the deflection of the beam: then ·77175 × 2 = 1·54350; and 1·065 × 2 = 2·130; neither of which results is very satisfactory with the actual fact of 1·8 inches. The new edition (1851) of Barlow says that the deflection of the arm will be *equal* to that of the beam; but the experiment clearly contradicts this authority. I am, therefore, inclined to put entire faith in the result given from numerous experiments made with perfect apparatus by Barlow, which does not seem to have been affected by other researches during his lifetime; and to take the *double* as the safest guide.

Not being thoroughly satisfied with experimenting on one piece of timber, I have tried another, of a different size and somewhat different material; the opportunity and material for both having been obligingly furnished by Mr. Henry Burton, on his premises at Aldersgate-street. This second beam was provided as Memel, 10 ft. in length, 2 in. wide, and 3 in. deep, being slightly more than the proportion of 5 : 7,—that of the strongest form for a beam. The clear span was 9 ft.; and, with the ends loose as before, the beam deflected $\frac{12}{20}$ of an inch with $1\frac{1}{4}$ cwt. in the middle (L). With a $\frac{3}{4}$ cwt. placed at one-third of the length from each support, the deflection in the middle was $\frac{7\cdot5}{20}$ (M). With $1\frac{1}{4}$ cwt. placed at one-third from one support, the deflection was at that point $\frac{7}{20}$ (N); while at the middle the deflection was $\frac{8}{20}$ (O).

With regard to the arm; one part, 5 ft. 6 in. long was securely fixed, when the projecting portion, 4 ft. 6 in., deflected, with $\frac{3}{4}$ cwt. at P (as in above diagram), $\frac{21\cdot5}{20}$ in., or *just about three-quarters* ($= \frac{23\cdot75}{20}$) *more* than that of the beam L. The same weight at Q gave a deflection of $\frac{5\cdot25}{20}$ at that point. At R of $\frac{12}{20}$ at that point. At S of $\frac{23}{20}$ at that point.

The two main results of this experiment, then, are,—I, that the *beam* deflected $\frac{12}{20}$ with $1\frac{1}{4}$ cwt.; and II, that the arm of half the length deflected $\frac{23\cdot5}{20}$ with $\frac{3}{4}$ cwt.; or 1·17 in.

Working out the deflection, L, with the formula as above given, we have $\frac{432 \times 729 \text{ ft.} \times 168 \text{ lb.}}{1{,}460{,}000 \text{ lb.} \times 2 \text{ in.} \times 27 \text{ in.}}$ = deflection or ·67, and the actual experiment gives ·65; but it must be noticed that I have again used the lowest modulus of elasticity for red pine, not Memel, as given by Rankine. Using the figures 1,957,750, as given by Tredgold for Memel, the resulting deflection is ·500. The inference might be drawn that the piece of wood was a weak specimen of Memel. I was glad to find that the two sets of experiments agree. But if any of your readers think that I could have carried them further, possibly they will spend an hour or two on an improved series, and communicate the result. But, perhaps, this *practical* reply will be found a satisfactory answer to the question so usefully propounded by "A Student," who will now probably be led to doubt the accuracy of the "thorough *mathematical* investigation" on which Fenwick, according to Mr. Tarn, arrived at conformity with the statement in the new edition of Barlow's *Treatise on the Strength of Timber*, 1851, which renders that edition of questionable utility from the necessity for making corresponding alterations in the text. Perhaps, however, some scientific friends may be able to explain wherein lies the difference of the results of the carefully executed experiments with those of the mathematical investigations.

Wyatt Papworth.

ARCHITECTURAL EXAMINATIONS.

The following candidates have passed the voluntary architectural examinations (established by the Institute of British Architects) for 1866: Class of Distinction—Thomas Henry Watson (Associate R.I.B.A.). Class of Proficiency—James Stanning Edmeston, Frederick Hunt (Temp. Stud. R.I.B.A.), R. Stark Wilkinson (ditto), and Thomas Wonnacott.

The Pugin Travelling Studentship for 1866 has been awarded to Mr. Hubert J. Austin, of 20, Spring-gardens.

GREAT FOSTERS, NEAR EGHAM.

An interesting specimen of Elizabethan domestic architecture near London, is about to change hands. Great Fosters, or Great Foster House, so called to distinguish it from Little Fosters near, bears the date of 1575 on the Royal arms over the doorway. It is situated on the road from Egham to Stroud, and has now only fifteen acres of land pertaining to it, though originally Foster Farm adjoining must have belonged to it. The fore-court, tiled floor of the dining-room, one carved mantel-piece, and a few wainscoted rooms and carved sideboards and chests, still remain; and all the windows of the front are still in their original state, but some of the windows of the back or lawn-front have been modernised. The old moat, banks, and slopes also still remain; and we believe that the new purchaser, Lieutenant-Colonel Halkett, formerly of the Guards, a son of the late Sir Hugh Halkett, intends to restore the mansion, as far as possible, to its original condition. The tradition about the place is, that it was dwelt in or built by a Judge Foster, one of Queen Elizabeth's judges, who gave his name to the place. Another tradition is, that the Queen herself at one time resided there, and the Royal arms and date of 1575, favour this notion, 1558 having been the year of the Queen's accession. Perhaps some of our antiquarian readers may know something of the history of the place. The last possessor of it was the late Mr. George Frederick Furnivall, of Egham, the medical attendant of Shelley and his wife during their residence at Marlow, and about whom a paragraph lately went the round of the papers.

HAVRE AND ROUEN.

At Havre, the demolitions necessary for the Rue de la Halle and its junction with the Rue François I., necessitate the destruction of the ancient house wherein Bernardin de St. Pierre first saw the light. This house is situated in the Rue de la Corderie, and bears the numbers 47 and 49, and was constructed in 1658 with a true magnificence for that epoch, remaining now one of the most ancient and important habitations of old Havre so dear to Richelieu. Bernardin de St. Pierre was, after Rousseau, the father of the modern descriptive style in prose, a style followed up closely by Chateaubriand and Sand. When the author of "Paul et Virginie" was born, the 19th January, 1737, his father, who claimed a lineal descent from the celebrated Eustache de St. Pierre, was director of the messageries or diligence service between Rouen and Paris. M. Verjon, into whose hands this property fell, caused, in 1820, a marble tablet to be affixed to the front of the house, with the following inscription:—"Ici naquit Jacques Henri Bernardin de Saint Pierre, l'an 1737."

At Rouen, a new station is being constructed, for the Rouen and Amiens Railway, called the Northern Terminus. It is remarkable for the difficulties met with in the work, and for the gigantic operations necessary to combat them, being placed, at Rouen, at the extremity of the Champ de Mars, at the end of the narrow valley which extends to the foot of the mountain on which stands the chapel of Bon-Secours. The site of the station is on the side nearest the town, bordered by an abundant water-course flowing through marshy grounds. The slightest excavation made in these lands is instantly filled with water, and it is on soil of this character that solid and durable foundations have to be established. This is to be accomplished by means of piers of brickwork, sunk in the following manner. A well is first sunk and kept clear of water by one of M. L. Coignard & Co.'s centrifugal pumps, which lifts also mud and gravel with the greatest ease. A circle of wood is then let down to the bottom, and on it is built a tube of brickwork, or chimney, laid in cement and quite watertight. The weight of the masonry is sufficient to cause the frame to descend a certain depth, and when it has ceased to descend of its own accord, a man descends and excavates with a pick the soil from under the frame, so as to facilitate its descent; at the same time, brickwork is added to the upper portion of this brick-pile, according as it descends. When a firm footing has at last been obtained, this hollow pillar is filled with concrete, thus forming a solid pier on which will rest a portion of the intended structure. There will be at least 140 or 150 of these piers sunk at an average of 20 ft. below the surface; they will bear the weight of the series of vaultings which are to form the base of the foundations thus raised above the level of the floods, left free to circulate round the piers. Our readers will remember a similar mode of building practised in India.

LIGHT AND AIR CASE.

PARISH v. WILKINSON.

Mr. Glasse and Mr. Waller moved in this case (Vice-Chancellors' Courts, Feb. 10) for an injunction to restrain the obstruction of light and air from the premises of the plaintiffs, who were pickle manufacturers, at No. 5, Munster-street, Regent's-park. The building in question formed a sort of single apartment or warehouse, and along the back of the wall, at the highest part immediately below the eaves, a range of opaque glass windows had been put in, with three or four additional panes at the end, and it was a portion of these latter windows, nearest the front of the building, which was alleged to be darkened by a building erected by the defendant, who was an upholsterer in Bond-street, for uses connected with his trade. It appeared that the wall now complained of was contemplated in June, 1865, and was actually commenced in November; and Mr. Bull, the defendant's agent, applied to the plaintiffs or their agent, Mr. Baker, as to the obstruction of light which would take place, and the wall on the 5th of January, being continued, was, by extra workmen (it was alleged), completed between 6 and 12 o'clock on the evening of the 8th, and this bill was filed and the injunction moved for.

The Vice-Chancellor observed that the Court was slow to grant a mandatory injunction—that is, an order involving the removal of what had been done, but no doubt such gross and oppressive cases might occur as to warrant such an order, and he should not lay down any rule that the Court had not such power on a proper case being made for it. Here if Mr. Bull had lulled the parties into security by his letter, it might have been a question whether a mandatory injunction ought not to be granted; but that was not, and, indeed, could not be so, the letter being in course of post when the building was proceeding. The plaintiffs, or their agents, might have known some months ago what was intended; but the first suggestion as to the obstruction came from the defendant. There was no case for an injunction, and the motion must stand over till the hearing; costs to be costs in this cause.

CHURCH-BUILDING NEWS.

Leeds.—The movement for the increase of church accommodation in Leeds is progressing. Another church has been resolved upon for the populous district of Newtown. The design for the building has been submitted to competition, and the successful architects are Messrs. Adams & Kelly, of Leeds. The period of the style selected by the architects is that of the thirteenth century. The plan of the church comprises a clerestoried nave and chancel, both with aisles. The chancel is terminated with a semicircular apse. A bell-turret is placed at the west end.

The nave is divided from its aisles by an arcade of five bays supported on piers with moulded bases and capitals, and is separated from the chancel by two framed trusses with carved braces resting on corbel shafts. Two-light traceried windows together with the single-light cusp window, of the clerestory and large west window, will light the nave and aisles. The chancel is lighted by five two-light traceried windows in apse. The roofs of the nave and chancel are of framed rafters covered with slating, in alternate coloured bands, surmounted with an ornamental ridge cresting. The church is to accommodate 600 persons. The seats are open benches. The walls throughout are of stone, faced externally with hammer-dressed wall-stones, with stone dressings and bands, and finished internally with plaster. The internal dimensions are:—Length, including chancel, 101 feet; width, including aisles, 47 ft. 6 in.; height, from nave floor to under-side of ridge, 50 ft. The church is to cost 3,000*l*.

Warwick.—Lord Leycester's Chapel, which has been undergoing repairs during the past eighteen months, has now been re-opened for divine service. The restorations have been carried out under the superintendence of Mr. Garner, of Wasperton Hill; Mr. Kyte, of Barford, being the builder, and Mr. Roome the clerk of the works. The old roof has been substituted by one in oak, carved and moulded. The floor is laid with encaustic tiles. In the east end of the chapel six additional stained-glass windows have been placed. The number of stalls for the brethren has been considerably increased, and the building heated with a hot-water apparatus. Additional support has been given to the arched tower and the stonework generally. A carved screen is to be erected at the west end.

Balsall Heath.—St. Paul's Church, Balsall Heath, has been re-opened, on the completion of the work of enlargement. The plans were prepared by Mr. E. Holmes, architect, which have now been carried out. About 200 additional sittings have been obtained, exclusive of seats for school children. This has been effected by the erection of a new south aisle, and by extending the west gallery. An organ-chamber has been built on the south side of the chancel, the case of which will form a feature under the arch in the south wall of the chancel. The choir has been rebuilt and deepened, and stalls for the singers have been provided on each side. All the alterations have been carried out in the Decorated style, with materials similar to those used in the other parts of the structure. The font has been moved to the east end of the south aisle. Four three-light windows, with varied traceried heads, afford light to the new aisles, and at the west end the original east window has received some adornment by the addition of a head moulding and some little carving. An additional staircase to the gallery has been provided at the south-west corner. The most important alteration, in an architectural point of view, is the substitution, in lieu of plaster, of a moulded and carved chancel arch, supported by marble shafts, with carved caps and corbels, the gift of Mr. Thomas Simcox. The east window, which is divided into five compartments, has been filled with stained glass, as a memorial window; it is from the manufactory of Messrs. Hardman & Powell, the subject being the conversion of St. Paul. A triple sedilia, of an ornamental character, each seat being separated from the other by serpentine marble shafts, with carved caps, and covered by cusped arches and moulded labels, with carved crockets and finials, is placed in the south wall of the chancel. On the north side is a credence. The original stone communion-rail has been brought forward in a line with the east wall of the nave, forming a dwarf chancel screen and a new communion rail of oak, supported by brass and iron standards, has been fixed in lieu of the old. The oak rail was the gift of Mr. Horsley, and the standards were presented by Messrs. C. Smith & Son, architectural metal workers. The original roof of the chancel has been decorated by Mr. Whitworth, from designs by the architect. The chancel floor is laid with encaustic and plain tiles, from the works of Mr. Godwin, of Lugwardine. All the seats in the new part are stained deal. The gas-fittings in the chancel and south aisles are from Messrs. Winfield & Co.; and Haden's hot-air apparatus has been fitted up. Mr. Green was the clerk of the works.

Jarrow.—Sir Walter and Lady James have subscribed 2,100*l*. towards the restoration of the church of the Venerable Bede at Jarrow, viz., 1,500*l*. towards the chancel and tower, and 600*l*. towards the nave. Other subscriptions have also been made.

Banbury.—It is very much desired to complete Christ Church by adding the spire, and a meeting of the parishioners has been held in the vestry for the purpose of making arrangements to raise the required sum, 1,000*l*., towards which 250*l*. have already been promised.

Rainham.—The church has been re-opened for divine service, after being closed for five months for the purpose of being repewed. This has been carried out under the superintendence of Mr. A. D. Gough, of London, architect. Mr. Stump, of Brompton, was the contractor.

Tarporley.—The chancel of the church here, which has been for some months past undergoing extensive repairs, has been formally re-opened by the bishop of the diocese. At the request of the late rector and an influential committee of the principal parishioners, designs for the restoration of the whole church were prepared two years ago by Mr. J. S. Crowther, of Manchester, architect; and it was decided to commence with the chancel and north chancel aisle (the south aisle having been restored at the expense of the Arden family). Mr. R. Beckett, of Hartford, was the contractor.

Malvern.—The domestic chapel in connexion with Rhydd Court, the residence of Sir E. A. H. Lechmere, bart., recently opened, was commenced by Mr. Hansom, architect of the Malvern College; but that gentleman, from ill-health, being unable to complete it, it was finished, and the interior decorations arranged, by Mr. R. Norman Shaw, of London. It is divided into three parts,—the chapel destined for the use of the household of Sir Edmund Lechmere, the ante-chapel (in which are forty chairs for neighbours from various farms and cottages a long way from the parish church and near the Rhydd), and the organ chamber. The chapel is separated from the ante-chapel by a low stone wall, which will ultimately be surmounted by a light metal screen. The reredos is divided into three compartments, the centre having an alabaster cross, set with marbles of different colours. The other compartments contain, the one the letters I.H.S., and the other X.P.C., in mosaics, set in gold mosaic. The mosaic work was executed in Venice by Signor Salviati, the carving being done by Mr. Earp, of London. The last window is by Messrs. Clayton & Bell: subjects, The Nativity, Crucifixion, and Ascension of our Saviour. The interior of the chapel is still incomplete.

Willenhall.—New cemetery chapels have been erected by the Burial Board. They are in the Gothic style. The walls are of brickwork, with Bath stone dressings. Coloured bands and cornices of moulded bricks have been introduced in the exterior and interior. The arches over the doors and windows are of deep red bricks, with springers and key stones of Bath stone. The north gable is surmounted by a bell-cot, having an ornamental finial of wrought iron. The roof is covered with red, blue, and brindled tiles, set in patterns, and having an ornamental ridge crest. The works have been executed by Mr. D. Evans, builder, from designs, and under the supervision of Mr. J. R. Veall, architect, Wolverhampton.

PROVINCIAL NEWS.

Sheffield.—New premises for the Sheffield and Rotherham Banking Company are about to be erected. The directors invited a number of architects to send in plans for a new bank, to be erected on the site of the old premises in Church-street. The design sent in by Messrs. Flockton & Abbott, of this town, was approved, and it is now being carried out. The aim of the architects was to produce a suitable front, which should take its place becomingly among the other buildings in the same street (the Cutlers' Hall and the Hallamshire Bank), and be effective and business-like, without excessive decoration. The style of architecture selected is the Italian. The bank will have a frontage to Church-street of about 70 ft., and the elevation will exceed that of the Cutlers' Hall. The front will be of Darley-dale stone, and the introduction of sixteen pillars of polished red granite will effectively embellish the design. The principal features of the exterior are those suggested by the purposes of the building, and are formed mainly by the banking-room with its entrance, and the general meeting-room on the first floor. The banking-room will be a large and lofty apartment, well lighted. Its dimensions are 55 ft. by 34 ft., and 21 ft. high; the total floor space being 1,835 ft. as compared with 625 ft., the floor space of the old banking-room. It is lighted by large and lofty windows at each end; and, although these would in themselves have admitted a fair amount of light, the architects have thought it desirable to provide in addition, a roof light for the central portion, so that the light throughout may be not only good, but equal. The dimensions of the room will admit of a counter 50 ft. long, the old counter being 20 ft. in length. Mr. Niell, of Bradford and Sheffield, is the contractor for the work.

Gloucester.—The Spread Eagle Hotel has been rebuilt and opened by a limited liability company. The architects were Messrs. Medland, Maberley, & Medland, of Gloucester. The style is modern Gothic. The cost of the work, which was contracted for by Mr. O. Estcourt, also of Gloucester, is estimated at between 7,000*l*. and 8,000*l*.

Redcar.—A site for the projected promenade pier has been chosen, at the foot of King-street, where the beach terminates in a cliff a few feet high, at which place they intend to erect a sea-wall 100 ft. to the westward, and 60 ft. broad, as a promenade, and which is intended to be an esplanade to the pier. The pier itself is to be commenced before April next, and is to be built of iron, running out to sea a distance of 1,200 ft. or thereabouts, sufficiently far for steamboats and pleasure-boats to effect an easy landing at all times of the tide. Efficient landing-stages are to be erected at the outermost end. The cost is estimated at 10,000*l*.

Bath.—The new central police station in the Orange-grove is now occupied. A carriage-entrance with great gates leads in by a *porte-cochère*, within which the prison van will be enclosed on the setting down or taking up of prisoners. Direct from this *porte-cochère* a large central stone hall is entered, in which are an inspector's office and a prisoner's dock. Under this hall, on the basement, are the lamp-room and other offices for the constables, while the upper floor, or story, approached by a stone staircase, is appropriated as offices for the chief of police, with rooms on either side for the detectives and clerks. A door from the stone hall opens on sufficient parade room, lighted and ventilated exclusively from above; and from this apartment again is a communication with the station proper. This latter consists of a central corridor and six large-sized cells partially vaulted with stone, but also lighted and ventilated from above. At the end of this corridor a stone staircase leads to the basement (in which is placed the heating apparatus) where is a number of small cells, in which prisoners committed for trial are locked up previously to their being placed "on their deliverance" in the dock at the Quarter Sessions. An arched stone passage leads from the cells immediately underneath the markets direct to the Guildhall. The contractors were Messrs. Hibbard & Long for the masonry, Mr. Clark for the carpentry, Mr. May for the plumber's work, Messrs. Glass & Gould for the smith's work, and Mr. Packer for the painting and glazing. The whole was designed and has been carried out under the supervision of Mr. Charles E. Davis, the city architect.

Merthyr.—It is now determined that the town-hall shall be erected opposite the Castle Hotel. For a long time the majority held to the view that the Market-square was the place best suited, but there has been a growing distaste to close the only open spot in the town. It is rumoured that there will be other alterations, of which this of the town-hall will be the forerunner. The school-rooms will be improved, the church tower built, and bells placed therein; further, the wall will probably be removed.

North Shields.—The new hall in Saville-street, North Shields, built by the Loyal British Flag Lodge of Odd Fellows, M.U., the foundation-stone of which was laid in June last, has been publicly opened. The building is of brick, with stone dressings. On the ground-floor are two large shops, and the hall above is 54 ft. in length, 29½ ft. in breadth, and 23 ft. in height. It will accommodate about 720 persons, 120 of whom will be seated in an eastern gallery. Connected with the hall is a committee-room as well as an ante-room, and two rooms for the keeper. The interior of the hall is lighted principally by a sun-light, containing thirty-three burners. The architect of the building is Mr. T. Forrest, and the contractor Mr. J. Coulson. The cost of the structure is about 1,500*l*., of which sum nearly 500*l*. have yet to be obtained.

STAINED GLASS.

St. John's, Welburn.—The Howards have perpetuated the remembrance of their deceased relative, the late Earl of Carlisle, by inserting a new western window in the newly-erected Church of St. John, Welburn, near Castle Howard, the late earl having reared this church as a memorial of his mother, the late Countess of Carlisle. The window is Decorated, and has four lights, divided by a transom, the upper half being devoted to illustrations of incidents in the life of the patron saint, and the lower to others in the life of Lazarus. The nieces of the late earl, the Hon. Misses Lascelles, have inserted a similar window in the south transept, also in memory of the deceased, the subject selected being Christ as the Good Shepherd,—an allusion to the close identity of the late earl with the Reformatory movement.

Tewkesbury Church.—Eight more windows of stained glass have been added to this church, as the gift of Mr. W. Kyle Westwood Chafy Chafy. They are the work of Mr. Frederick Preedy. Among the subjects delineated are the Annunciation, the Nativity, the Baptism, the Benediction of the Children, and the Good Shepherd.

Doncaster Parish Church.—Messrs. Ward & Hughes, of London, have completed a stained-glass window in this church, presented by Sir Isaac Morley, knight, in memory of his father, and other members of his family. The window is in the north aisle, between the one filled in by Dr. Vaughan's lay readers and that to the memory of Mr. Bower. This completes the windows in both the north and south aisles. Three important incidents in the life of Joseph are chosen,—the interpretation by Joseph to Pharaoh, king of Egypt, of his dream; the finding of the cup in Benjamin's sack; and the meeting of Jacob and Joseph. The interpretation of the dream is somewhat minutely represented.

St. Paul's, Birkenshaw, Leeds.—The east window of this church has been filled with painted glass, the erection of which is intended to perpetuate the memory of the late incumbent, the Rev. H. J. Smith, M.A. The window is in the Late Pointed style, and is of considerable magnitude. It is composed of four principal openings, and tracery of a simple design. The principal spaces in the central lights are filled respectively with pictorial representations of subjects from the New Testament; and are, on the left side, "Our Saviour blessing little Children," and on the right, "Christ's Charge to Peter," with the texts, "Suffer little children, &c.," and "Feed my sheep, &c.," inscribed beneath. Within spaces of a similar architectural character under the central openings are represented angels in a kneeling posture bearing scrolls inscribed, "Blessed are the dead which die in the Lord, for they rest from their labours, and their works do follow them." The principal subjects already mentioned are surmounted and enclosed by canopies enriched with brilliant colours. The side openings are occupied by life-size figures of the apostles, "Peter and Paul," each bearing a book, and their respective emblems, the keys and sword: they stand under canopies of a somewhat different description from those which frame the subjects in the centre lights. A canopied space under the figure of St. Paul contains a representation of the conversion of that saint on his way to Damascus, with the inscription, "Saul, Saul, why persecutest thou me?" The corresponding space under the figure of St. Peter contains the call of Peter, with the text, "Follow me, and I will make ye fishers of men." The main tracery openings contain figures of the four Evangelists, and in adjacent smaller spaces are represented their respective emblems. The other openings contain the Lamb and Vexillum, Pelican, and the sacred monograms, I.H.S., I.H.C., and A. & O. The window was executed by Messrs. R. B. Edmundson & Son, of Manchester.

Holy Trinity, Winchester.—The parishioners of this district church, headed by the incumbent, the Rev. G. A. Seymour, M.A., recently subscribed for the purpose of filling one of the windows, as a memorial of the late Mr. R. C. Gale. The sum subscribed was quite ample to fill in two windows, one at the south and one at the north, the first containing a New Testament scene—the return of the prodigal son; and that to the north one from the Old Testament—the finding of Moses—both bearing in the heads also an angelic figure carrying the motto, "Alleluia, Alleluia." The family of the deceased gentleman have also caused another south window to be filled as their memorial. The scene in this is from the New Testament, "The Good Shepherd," and is generally similar in effect to the other. The stained glass was arranged and executed by Messrs. Clayton & Bell, of London.

Cheadle Church, Cheshire.—This church has been embellished with a stained-glass window, of three lights (9 ft. long by 1 ft. 6 in. wide), which has been placed on the south side of the chancel by Mr. George Peel, of Brookfield, in memory of the late Mrs. Peel. The design is taken from the life of our Lord: on the left is represented Jesus, sitting with Mary, holding the Sacred Book at His feet, and Martha standing attentively watching and listening to the words addressed to her (St. Luke, x. 30 to 42). The subject in the centre illustrates the Resurrection, with the three Marys at the Tomb, the Angel appearing. (St. Mark, xvi. 4 to 6). The subject of the right hand light is Mary when she comes to the sepulchre, and Christ appears to her in the garden. (St. John, xx. 15 to 17). The spaces above the subjects are filled with canopy-work. At the base of the left and right hand openings are two angels adoring, holding scrolls, with the following text:—"Blessed are the dead which die in the Lord." Under the centre one is placed the Peel coat of arms, with a shield of pretence, bearing the arms of the deceased. The three compartments at the bottom of the window are surrounded with architectural canopy-work and placed on diapered, ruby, and blue backgrounds. The style of the window is of the latter part of the fourteenth century. The artist was Mr. Charles A. Gibbs, of London.

Holy Trinity Church, Whitehaven.—All the windows, nearly fifty in number, have been filled with coloured glass. In the chancel, a large window, containing two subjects,—the Resurrection and the Last Supper,—has been inserted. At either end is a memorial window, executed in the same style. The one, erected by Mrs. Dixon, in memory of her late husband, has for its principal subject "Christ Stilling the Storm;" and the other, placed by the Misses Grisdale, in memory of their parents, is "The Raising of Lazarus." Messrs. Chance, Brothers, of Birmingham, were the artists employed. The cost of the chancel and the side windows has been defrayed by the congregation, the Earl of Lonsdale, and a few other friends.

Books Received.

Warne's Coloured Texts. Designed by JOHN MARCHANT. F. Warne & Co.

THESE texts, a dozen in number, are executed in oil-colour printing, by Kronheim's process, and are intended, we suppose, for the walls of schools and other meeting-places. The execution is better than the design. To deal successfully with colour, a man must be born with the power.

VARIORUM.

THE first number of *The Universal Financial Review*, contains some plain speaking and some useful advice. It proposes to make honest inquiry into the merits of every new company, to investigate the character of promoters, to sift guarantees, and do many other things that would serve the public if properly performed. There are difficulties in the way, but these are recognised and are not insurmountable.——An interesting sketch of the History of Caricature will be found in the current *Quarterly*. It includes a few pages on foreign caricaturists. ——The current No. of *Fraser's Magazine* contains a paper on "The Indigent Class—their Schools and Dwellings," by Miss Frances Power Cobbe, which keeps alive the discussion of the question. The writer agrees with Mr. Thos. T. Taylor in urging the necessity for buying up overcrowded and pestilential districts, and granting compulsory powers to local boards and town councils to enable them to do so.——*The Argosy* is going on well. No. III., the last published, is the best. Mr. Chas. Reade's story increases in interest. The ladies muster strongly: we have in this part Miss Isa Craig, Miss Bessie Parkes, Miss Rossetti, Miss Amelia Edwards, and others.—— "Results of the Creosoting Process for Preserving Timber under Mr. John Bethell's Patent. Offices, King William-street, London Bridge." In this pamphlet Mr. Bethell invites attention to his well-known process which has now been twenty-five years in use. The pamphlet contains pretty good evidence of the success of the process, which is in extensive use on railways, foreign as well as British, for sleepers. Much of the timber has been down from twenty to twenty-five years.—— "The Brown Book for 1866. London: Saunders, Otley, & Co." This is a very useful metropolitan guide and reference-book, especially for the use of visitors to London, as it contains a great variety of information as to hotels and boarding-houses, *restaurants*, amusements, exhibitions, post-offices, institutions, societies, &c. Were it not that the theatrical people themselves, in their advertisements, never state the locality of the theatre, far less the prices, we might ask the editor of "The Brown Book" why he does not do so. We are convinced that simply on this account much money is lost to theatres, not merely from visitors, but from Londoners also, especially from not knowing, or from forgetting, precisely, where the theatres are situated. If "The Brown Book" requires to give (as it does) the address of the British Museum or the National Gallery, surely it is at least as necessary to give the address of Her Majesty's Theatre, and others as well. We are glad to see that our former suggestions have not been overlooked. ——The sixth volume of "Penny Readings," just now published (F. Warne & Co.), completes the first series, and contains an index for the whole. It is a capital selection, and will serve as well for railway reading and waiting-room tables as for the amusement of assembled numbers in front of the Institute platform.—— "Walker's Pronouncing Dictionary," with Webster's definitions and Worcester's improvements, and all for a shilling. It is edited by Dr. Austin Nuttall, and published by F. Warne & Co.—— "Castaway on the Auckland Isles. From the private Journals of Captain Thomas Musgrave, together with some Account of the Aucklands. Edited by Mr. J. J. Shillinglaw." This is a narrative of the wreck of the *Grafton*, and of the escape of the crew, after twenty months' suffering, and serves to show the good stuff of which our seamen are made. The story is full of interest.

Miscellanea.

READING SCHOOL OF ART.—We are requested to correct a statement as to the mastership of this school in our impression of the 10th instant. Mr. C. R. Havell has been the head-master of this school since its opening in 1860, and is so still.

TRACTION ENGINES AND GREAT LOADS.—Two traction engines, supplied by Messrs. Aveling & Porter, were employed successfully in transporting from the Great Western railway premises to their destination, the two masses of granite which will form the base and column of the Wellington Memorial at Strathfieldsaye. The weight of one carriage, with its load, was about 40 tons.

ROYAL GALLERY OF ILLUSTRATION.—Mr. German Reed, after running the "Peculiar Family" for a year, is about to resort to novelty. A new entertainment, by Mr. F. C. Burnand, is in active preparation; and Mr. John Parry will describe the incidents of "A Wedding Breakfast." Mrs. Roseleaf's "Little Evening Party," the most admirable thing of the kind ever done, will therefore be given for only a few nights more.

MARLOW MEN.—The *Reading Mercury* says,—"In a late number of the *Builder*, under the head of 'Newcastle Cemetery,' were published the awards of premiums for the best designs of building for the above cemetery. The first premium was awarded to Messrs. Bellamy & Hardy, of Lincoln; the second to Mr. Stallwood, of Scarborough. Mr. Stallwood being closely connected with and a native of Marlow, his friends have reason to be proud of his attainments and perseverance, inasmuch as his design was prepared after business hours, and successfully competed with some of the largest firms in this county. This is not the first time Marlow has sent forth eminent men, as a proof of which we may mention Sir Morton Peto, who was educated at Marlow; also Mr. Edwin Clark, the designer of the Menai Straits Tubular Bridge; also Mr. Latimer Clark, who invented the electric telegraph to India, &c., &c. These were all natives of and educated at Marlow."

HALIFAX SURVEYORSHIP.—Mr. T. D. Barry, C.E., Leamington, has been appointed the borough surveyor and waterworks manager, at a salary of 400*l.* per annum. Mr. Wm. Wood, Halifax, was appointed the assistant surveyor, at 150*l.* Mr. Stevenson has resigned the post of borough engineer.

LIVERPOOL ARCHITECTURAL SOCIETY.—At the fortnightly meeting of this society, held on Wednesday, the 7th inst., the paper for the evening was read by Mr. Oppenheimer, of Manchester, and several specimens of Austrian parquetry were shown by that gentleman. Mr. Waddington, who represented the Manchester Patent Plaster Foundation Company, exhibited some specimens of their new invention in plastering. Its chief recommendations claimed were imperishability and freedom from expansion or contraction.

SEWER ACCIDENT AT WALHAM-GREEN.—In a deep cutting connected with the sewerage opposite the Swan brewery at Walham-green the earth gave way on Wednesday in last week, burying a man, whose legs became fixed beneath some timber. As the earth was still falling, his fellows refused to go down to relieve him, and Mr. John Hill, of Fulham, a corporal of the 1st Middlesex Engineers, volunteered to descend, and, with a trowel merely and his finger-ends, till the nails and flesh were torn off, he laboured on till the poor fellow was liberated, after twelve hours, without any very serious injuries.

VESTRY REPORT ON CHELSEA.—The ninth annual report of the vestry of the parish of Chelsea, under the Metropolis Local Management Act, 1855, has been printed, by Bell, 133, King's-road. The medical officer of health's report states that the death rate of each district remains very much the same as at his last report. Typhus fever has been infesting the back-to-back houses in Mermaid's-yard and other such localities, generally over-crowded; but, on the whole, the parish has been comparatively free from fever. The Chelsea vestry report is always an elaborate one, including everything, apparently, connected with the doings of the vestry and its officers. It extends to nearly 400 pages: and does credit to Mr. Charles Lahee, the vestry clerk.

CHARING-CROSS HOTEL COMPANY (LIMITED).—The directors of the Charing-cross Hotel Company have issued a report of a very favourable character. It is stated the house has been well filled from the beginning, and numerous applications for apartments have constantly been declined. The trade receipts from all sources during the seven months and a half ending 31st December, 1865, amounted to 46,482*l.* 3s. 1d.; and after placing 2,000*l.* to the credit of the reserve fund for depreciation and renewals, there remains a balance of 13,265*l.* 5s. 5d., and the directors recommend that a dividend be declared at the rate of 12 per cent. per annum, or 15s. per 10*l.* share, free of income-tax, for the seven months and a half, leaving 1,265*l.* 5s. 5d. to be carried over to the next half-year. The directors, at the meeting on Monday, February 12th, passed a special resolution, enabling them to borrow the additional sum of 20,000*l.* Great complaints are made as to the want of attention found by visitors. The directors should see to this in time.

DAMAGES TO BUILDINGS BY THE LATE GALES.—At Doncaster, the centre pinnacle on the north side of the tower of the parish church, and the smaller one next to that, at the south-eastern angle, were blown down, and much damage thereby done to the leadwork and to the parapet wall of the south transept.——Two houses have been unroofed at Hartlepool, and four children buried in the ruins.——At South Stockton, the puddling sheds of the North Yorkshire Iron Works were blown down, and one man killed and two others seriously if not mortally injured. ——The steeple of St. Nicholas, at Newcastle-upon-Tyne, rocked to and fro in the gales, that it was expected every moment to fall. The council and churchwardens are still at loggerheads as to the repair and restoration of this church. It is suggested that the plan adopted in 1644, by the mayor, to secure this very steeple, when the Scots threatened to batter it down,—namely, filling it with Scottish prisoners,—should be repeated with the council and churchwardens, during gales of wind.——The spire of St. James's Church, Leith, which was just on the eve of completion, has been damaged by the swaying to and fro of the scaffolding.

DESTRUCTION AT WELLS.—All who know the charming walk by the moat which surrounds the Bishop's Palace, in Wells, a picturesque and delightful spot, will hear with dismay that because two or three of the fine trees here were blown down recently, the other trees are being hewed down ruthlessly. Can nothing be done to save those that are as yet untouched?

NON-COMPRESSIBILITY OF WATER.—It is often necessary, before re-melting cast-iron, to reduce large masses of it to pieces. This, by the method ordinarily used, is both troublesome and difficult. The *Scientific Review* says,—A simple and ingenious mode of producing the required fracture has been recently used in France. It consists in drilling a hole in the mass of cast-iron for about one-third of its thickness, and filling the hole with water, then closing it with a steel plug, which fits very accurately, and letting the ram of a pile-driver fall on the plug. The first blow separates the cast-iron into two pieces.

THE SCANDINAVIAN EXHIBITION BUILDING AT STOCKHOLM.—It was lately reported by the Stockholm correspondent of the *Morning Post* that the building in course of erection for the Great Exhibition to be held in July would not be sufficiently large to answer all the purposes for which it was intended; and it is now found that even with the projected additions it will not be large enough. It has therefore been deemed necessary to procure new plans, which will make the building twice the size that had been originally intended. In the Exhibition of 1847, the number of exhibitors only amounted to 215; but it has now reached 2,200.

LIVERPOOL IMPROVEMENTS. — In the town council last week, Mr. Alderman Stewart took up the subject of the report of the architect and surveyor as to acquiring portions of the site of Compton House, &c., for the widening of Church-street and Basnett-street. The proposed improvements will involve the payment by the Corporation of the sum of 8,500*l.* The report was agreed to. Mr. Alderman Stewart also moved the adoption of the report of the architect and surveyor as to adapting Newsham House for judges' lodgings, and recommendation, in substitution of the resolution authorising the erection of a new building, to adapt Newsham House for that purpose, as suggested by the architect and surveyor, at a cost not exceeding 2,000*l.* This motion was also carried.

THE PORTRAIT EXHIBITION. — "A Reader" says,—The communications in your pages on the subject of portraits for the intended Exhibition, remind me of a notice, in Sir B. Burke's "Heraldic Visitations" (1855, 2nd series, i., 197), of Barbavilla House, Collins Town, county Westmeath, the seat of Mr. W. B. Smyth. It was built, in 1730, by William Smyth, son of William Smyth, Bishop of Kilmore (one of those formerly alluded to in your pages),—and contains, among other relics, "a very good Sir Peter Lely, of Sir John Povey, Lord Chief Justice of Ireland, 1676—9, the father-in-law of Wm. Smyth, Bishop of Kilmore and Ardagh." This portrait has never, probably, been either engraved or photographed, and would therefore have at least the interest of novelty; but as the difficulty of the commissioners will doubtless be in the superabundance of paintings offered, the owner might perhaps not be inclined to present it for acceptance.

KING JOHN'S PALACE, SOUTHAMPTON.—We are glad to be told that the reported destruction of King John's Palace is not correct. Mr. Dutton Smith, writing of these remains, says:—"The two structures on either side of the postern gate as the spectator enters Blue Anchor-lane constitute the palace of King John. They were erected early in the twelfth century, and are acknowledged to be [amongst] the earliest specimens of domestic architecture existing in England. The building to the right (entering the postern) is 50 ft. long and 40 ft. broad; it has in the north wall the remains of a fine Norman fireplace, and to the west a doorway, with three windows, with a window and door on the north. The other building to the left is 16 ft. long on the western side, and 45 ft. in breadth, with a Norman doorway on the south and a window and door of the same date on this side. The lane (10 ft. wide) separating the houses is steep in its descent, and leads direct to a flight of steps at the water's edge, where many a proud galley has waited for its kingly freight and the beauty of courts; but the beauty of the courts adjoining are certainly *not now* proverbial."

IMPROVEMENTS IN PARLIAMENT-STREET.—In the Commons, Mr. Cowper, has brought in a Bill to enable the Chief Commissioner of Works to acquire the buildings between King-street and Parliament-street, as far as Charles-street.

SHREWSBURY GENERAL MARKET.—In reply to the advertisements in the *Builder* and the local papers, for plans to be sent in on or before the 31st of January, the committee have received fourteen in number. The plans are deposited in the large room of the town-hall, for inspection by the public.

GRAVESEND.—The company formed some time since for the building of a large hotel at the corner of Harmer-street and the Terrace, have commenced operations by taking possession of the Assembly Rooms, which the company have purchased. The company is styled the Royal Alexandra Hotel Company (Limited). Another company is in course of formation, the design of which is to build a hotel on Windmill-hill, make pleasure-gardens there, and erect villas around the hotel.

MORECAMBE.—The contract for the erection of a sea-wall in front of the Green at Morecambe has been taken. The contractor is Mr. John Turner, of Morecambe, who undertakes to execute that portion of the wall commencing at a point opposite the Queen's Hotel, and stretching as far as Northumberland-street, for the sum of 690*l.* The portion of the wall which the Midland Company have undertaken to erect themselves is of considerable extent—from Northumberland-street to the Jetty—and it will cost, it is said, 1,000*l.*

THE INSTITUTION OF ENGINEERS IN SCOTLAND. At the meeting on Wednesday, the 14th, the following medals awarded for papers read during Session 1863-64 were to be presented: — the Marine Engineering Medal, to Mr. James R. Napier, for his paper "On the Incrustation of Marine Boilers;" the Railway Engineering Medal, to Mr. John Downie, for his paper "On Renewing the Substructures of Railway Bridges and Viaducts, without Stopping the Traffic;" the Institution Medal, to Mr. James M. Gale, C.E., for his paper "On the Glasgow Waterworks." The Institution would be asked to decide what paper read during Session 1864-65 is entitled to the Institution Medal.

AS TO VENTILATION. — The effect of compressed air in determining the entrance of a large quantity of air from the atmosphere, was curiously exemplified by a recent experiment of M. Galibert, according to the *Scientific Review*. He took one of those bags which he uses with his respiratory apparatus, holding about twenty-six gallons, and having an apparatus at the top about 4 *in.* wide; and, holding the apparatus open, projected into the middle of it, during four or five seconds, a small puff of air compressed by the mouth and lips. After this he closed the aperture by pressing the edges together with his fingers, then shook the bag, and struck the bottom of it against the ground. It was now one-third full of air,—that is, contained nearly nine gallons, while the air which had caused the entrance of this large quantity did not amount to half-a-pint. He repeated this operation twice, which caused the bag to become quite full of air. The development of this principle might tend to useful results in ventilation.

NEW MODE OF SAWING STONE.—Instead of the saw ordinarily employed, a disc of lead, kept well covered with emery, has been used for some time past in France with great success and economy. The lead is cast on a circular plate of cast iron, of sufficient thickness and diameter, and pierced with holes, which, by means of the lead with which they become filled in the casting, unite together strongly the thin sheets of lead at its two sides, which are joined also at the circumference of the disc. The emery falls from a reservoir above the disc, and the surplus is conveyed into a trough underneath, whence it is brought back to the vessel which feeds the disc. This apparatus is either moved on a carriage to the rock which is to be cut, or the block of stone is brought up to it on a carriage. A saw of this description, about 3 ft. 6 in. in diameter, driven by a 4-horse power, was found to move through Carrara marble at the rate of about 2½ inches per minute, and through Normandy granite at the rate of nearly an inch in the same time; and the cost of cutting was scarcely the one-sixth of that with the ordinary method.—*Scientific Review*.

Congregational Memorial Hall. — The Independents are about to erect a "Nonconformist Memorial Hall" in Cannon-street, London. The building is expected to cost 80,000*l*. The site alone costs 48,000*l*.

Operative House Painters.—The Wolverhampton Operative House Painters' Society has just served a notice upon the master painters claiming a rise of wages, half-holiday on Saturdays, and other privileges. Last year the wages were increased by 2s. per week.

Communication between Railway Guards and Passengers.—Mr. H. B. Sheridan has given notice that on Tuesday, the 27th of February, he will move for leave to bring in a Bill to compel the directors of railway companies to provide efficient means of communication between the travellers and the guards in charge of railway trains. The communication, as we have for many years urged, to be really efficient, must be direct and personal, and not solely by telegraphing, of any description.

The Poor in the Metropolis.—In the House of Commons, on Tuesday, Lord Cranbourne asked the president of the Poor Law Board whether it was his intention to introduce any measure for more effectually securing the execution of the laws relating to the poor in the metropolis. Mr. Villiers said, in answer to the inquiry,—"I beg to state, that it is my intention to introduce a measure for more effectually securing the execution of the laws relating to the poor in the metropolis, and that this measure will be substantially based on the recommendations of the select committee appointed by the last Parliament to inquire into this matter."

City Offices Company.—The foundation-stone of the City offices, now in course of erection for this company, was laid in the presence of the members of the Board and the directors, by Mr. Edward Masterman, one of the directors. The stone laid was one of the granite bases to support the columns on each side of the entrance-doors. It was bedded on a block of Portland stone, in which was formed a cavity to contain the coins of the present reign, the prospectus and papers of the company, &c., over which was placed the following inscription, engraved upon a plate of strong lead:—"The first stone of this building, erected by the City Offices Company (Limited), and extending from Bishopsgate-street Within to Old Broad-street, was laid on the 1st of February, in the year of our Redemption, 1866." Messrs. Frederick John & Horace Francis are the architects to whom the building is entrusted.

Keying Bricks.—By the simple and not novel invention of moulding common bricks with dovetailed grooves in various ways, by means of which they can be more firmly cemented together, a decided improvement in the construction of brick walls appears to have been secured, at little or no additional cost, and, indeed, to the saving of the cost of iron bonding. The patentee is Mr. T. L. Jowett, of Swansea, architect. His specification includes the manufacture in any plastic material. The various applications of such an invention will be very obvious to our professional readers; but we may instance a secondary or incidental one: thus, by inserting pieces of wood, flush with the plaster, in the grooves before setting, joiners' work, or any ornamental work requiring nailing, can be easily fixed. The bricks can all be made and used as common bricks, and architects and engineers can specify them without breaking existing contracts.

The Central Argentine Railway.—We find from the report presented at the second meeting of the Central Argentine Railway Company, that the works on this interesting and important line are proceeding satisfactorily, and that before the end of the year 1867, we shall have the entire length of the line, 247 miles, completed. The terminus at the port of Rosario occupies a river frontage of large extent. It is with great satisfaction we also note that the recent disputes between the Brazilian Government and Uruguay have not in the least degree affected the interests of the company: the calls upon the 50,000 shares have been regularly paid, and there seems reason to believe that the greater exploit which Mr. Wheelwright contemplates,—namely, the prolongation of the Central Argentine Railway across the entire country to Chili, and thus forming a highway for the traffic between the Atlantic and the Pacific,—will be attended with success.

A Town-hall for Southwark.—The necessity of obtaining for Southwark a town-hall or public-meeting place, with suitable offices, is being urged.

The Doncaster Borough Surveyorship.—In consequence of increasing duties attached to this office, the council in committee have unanimously resolved to increase Mr. Anelay's salary from 150*l*. to 200*l*.

Accidental Extinction of Fire.—Fire was discovered to have broken out in one of the offices in Exchange-buildings, Cathcart-street, Greenock. The flooring had taken fire in consequence of a stove not having been properly raked out on the previous night, and the flooring around having been burned, the stove had fallen into the office beneath, and had ignited the woodwork there. Fortunately the heat had melted a water-pipe, and in consequence the water extinguished the fire before any very serious damage had been done.

Houses for Hertford.—Houses have been much and long wanted in Hertford. According to the local *Mercury*, it is now proposed to form a company (under limited liability), for the purpose of acquiring suitable building sites immediately adjacent to the town, and erecting thereon good villa residences. The company will be started with a subscribed capital of 20,000*l*., and to build as many villas as this sum will enable the company to complete. Some of these may be let, others will be sold, and the capital thus released employed in building new houses. The shares are to be 10*l*. each, and we understand they will not be called up in less than two years.

The Palestine Exploration Fund.—There is a further report from Captain Wilson, in charge of the first exploring party of the association, dated Banias (Cæsarea Philippi), Jan. 2. The positions of Damascus, Kaukab, Jeba (not marked on the maps), Banias, and the junction of the Hasbany and Banias rivers, have been fixed astronomically. Plans have been made of the great Mosque at Damascus, of Bab-Shurky (the Roman Eastern Gate), and of the Mound of Tel Salhiyeh. Excavations had been made in three places in the mound, but with no decisive result, except the discovery of one sculptured slab of a quasi-Assyrian character. Photographs have been taken of the Mosque at Damascus, and various other objects of interest.

A Heavy Contract.—The Judicial Committee of the Privy Council have given an important decision against the Government of South Australia, relative to a claim made by a contractor whose name we have not learnt, but who is related to Mr. D. Johnston, of Maidstone, for the sum of 110,000*l*., as part of a contract for constructing a railway from Geelong to Ballarat, with a large viaduct called the Moorabad. The contract was for 1,375,000*l*., and 10 per cent. was to be reserved as a guarantee for its completion. The railway was completed three years ago to the entire satisfaction of the Government; but a question arose in consequence of the wording of the contract as to their liability to pay the 10 per cent. The question was tried before the Supreme Court in Melbourne, and decided against the contractor. It was then removed from Melbourne to this country, to be tried before the highest court, and their lordships have delivered judgment in favour of the contractor for 7,000*l*. more than was claimed.

The Croydon Irrigation System for Banbury.—A long letter has appeared in the *Banbury Guardian*, in which Mr. James Cadbury explains the Croydon system, and suggests its applicability to the Banbury sewage. He says that this town promises "all the means requisite to carry out works of great utility to the land, to purify and render perfectly wholesome and sweet all the drainage that passes through the sewers of Banbury; and, instead of the polluted stagnant pools lately afflicting every one, we may have a pure river of water abounding with animal and vegetable life." In conclusion, he says:—"With these facts and conclusions I trust we may be able to meet the adverse decision of the Chancery suits, with a disposition to reconcile our situations as not only honourable, but as likely to prove beneficial to the country at large, and to show how thoroughly right the decision was to maintain all our rivers in an unpolluted state. The same question is greatly agitating American cities, which will soon apply the same means for their own benefit."

Shocking Accident with Molten Pewter.—In Aldersgate-street, London, fifteen men have been seriously, and it is feared some fatally, scalded by molten pewter. The premises belonged to Mr. Maw, surgical instrument maker. It appears that at the top of the building is what is in the trade termed a pit, which, at the time of the accident, contained, it is stated, about three tons weight of molten metal. Standing round the pit with their hot moulds, for the purpose of filling them, were ten of the workmen, and five others were standing some distance off. Whilst the men were thus employed the metal was suddenly blown up by something explosive in the molten mass, breaking the skylight at the top of the house, and falling upon every person near. Fourteen persons were removed to St. Bartholomew's Hospital. The opinion of some of the sufferers is that during the gale of the previous day rain had by some means fallen into or around the pit of metal.

The York Mansion House.—The reception-rooms on the ground-floor have been decorated. Originally two rooms, they present excellent examples of wood panelling prevalent at the period of the erection of the Mansion House (1726), from designs by the Earl of Burlington. At some subsequent period the partition-wall was removed, and replaced by a Tudor arch and large folding-doors. These doors now being dispensed with, open out an apartment about 50 ft. by 20 ft., and 13 ft. high. The work was entrusted to Mr. Worthington, of York, decorator. The prevailing colours adopted are Naples yellow, relieved with complementary tones of colour and gold. The painted ornaments on the large plain wood cornice are such as were used at the period in enriched work. The dado panels are black, relieved with lines and ornaments of the wall colour, and bordered with a subdued green and maroon, fret and petræ, the whole resting on a deeper coloured plinth. The oil paintings that were in different patterned frames, and were hung over the panel mouldings have been taken out of the frames and let into the wall panelling. The doors are painted crimson, highly polished, and the mouldings gilded. The architraves of the doors, the framework and spandrels of the arch, and the shutters are painted light grey, relieved with gold. The detail drawings and paintings of cameo, &c., are by Mr. T. Stockton Worthington, lately a pupil at the York School of Art.

TENDERS

For new schools for St. John's Church, Battersea, for Rev. E. Thompson. Mr. G. U. Page, architect. Quantities supplied:—

Creswell	£1,860 0 0
Mulliner & Cooper	1,850 0 0
Palmer	1,819 10 0
Gammon & Sons	1,775 0 0
Newman & Mann	1,756 0 0
Lathey, Brothers	1,730 0 0
Champion	1,557 0 0
Bass	1,520 0 0

For erecting church at Charlton, Kent. Mr. W. Wiggington, architect. Quantities supplied:—

	No. 1 Design.	No. 2 Design.
Killby	£6,231 0 0	£5,385 0 0
Axford & Willier	6,204 0 0	5,358 0 0
Myers	5,939 0 0	5,343 0 0
Ennor	5,915 0 0	5,216 0 0
Simpson & Co.	5,835 0 0	5,174 0 0
Abraham	5,469 0 0	4,813 0 0

Alterations to Simpson's Hotel, Strand. Messrs. Finch Hill & Paraire, architects. Quantities supplied:—

Simpson	£8,050 0 0
Browne & Robinson	7,950 0 0
Myers & Son	7,775 0 0
Killby	7,720 0 0
Holland & Hannan	7,672 0 0
Brass	7,143 0 0

For sewers in North-street and Lower North-street. Mr. Joseph Pattisson, surveyor.

Stanafield	£1,137 0 0
Redding	1,068 0 0
Whittick	975 0 0
Neave (accepted)	869 0 0

For a villa residence for Mr. Angrave, at East Leake, Notts. Quantities furnished. Messrs. Shenton & Baker, architects, Leicester:—

Porter	£4,150 10 0
Bland	4,145 0 0
Neale & Sons	3,900 0 0
Osborne Brothers	3,825 0 0
Hutchinson & Son	3,132 19 0

For elastic web factory, Brougham-street, Leicester, for Messrs. Jones, Brothers. Mr. W. S. Burton, architect:—

Chambers	£860 0 0
Hutchinson	802 0 0
Johnson	775 5 6
Eagle	772 0 0
Cox	750 0 0
Wright (accepted)	738 4 0